UNIVERSITY OF CALIFORNIA

Michael V. Drake, MD
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December 15, 2020

The Honorable Holly J. Mitchell
Chair, Joint Legislative Budget Committee
1020 N Street, Room 553
Sacramento, California 95814

Dear Senator Mitchell:

Pursuant to Section 104500 of the Health and Safety Code, I am pleased to enclose the University of California's report to the Legislature on the Tobacco-Related Disease Research Program, 2015-2020.

If you have any questions regarding this report, Associate Vice President David Alcocer would be pleased to speak with you. David can be reached by telephone at (510) 987-9113, or by e-mail at David.Alcocer@ucop.edu.

Sincerely,

Michael V. Drake, MD
President

Enclosure

cc: Senate Budget and Fiscal Review
The Honorable Richard D. Roth, Chair
Senate Budget and Fiscal Review Subcommittee #1
(Attn: Ms. Anita Lee)
(Attn: Ms. Jean-Marie McKinney)
The Honorable Kevin McCarty, Chair
Assembly Budget Subcommittee #2
(Attn: Mr. Mark Martin)
(Attn: Ms. Carolyn Nealon)
Mr. Hans Hemann, Joint Legislative Budget Committee
Ms. Erika Contreras, Secretary of the Senate
Ms. Amy Leach, Office of the Chief Clerk of the Assembly
Mr. Jeff Bell, Department of Finance
Mr. Chris Ferguson, Department of Finance
Ms. Rebecca Kirk, Department of Finance

Mr. Gabriel Petek, Legislative Analyst Office
Ms. Jennifer Pacella, Legislative Analyst Office
Mr. Jason Constantouros, Legislative Analyst Office
Provost and Executive Vice President Michael Brown
Executive Vice President and Chief Financial Officer Nathan Brostorm
Vice President Theresa Maldonado
Senior Vice President Claire Holmes
Associate Vice President David Alcocer
Associate Vice President and Director Kieran Flaherty

THE TOBACCO-RELATED DISEASE RESEARCH PROGRAM FIVE-YEAR REPORT: 2015-2020

December 2020

TOBACCO-RELATED DISEASE RESEARCH PROGRAM

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1 Executive Summary

Thirty-two years ago, California voters transformed the state's tobacco control efforts with the passage of Proposition 99, the California Tobacco Health Protection Act of 1988. The Act instituted a 25¢ per pack cigarette surtax and designated 5 percent of revenues ($0.0125 per pack) to tobacco-related disease research resulting in the formation of the Tobacco-Related Disease Research Program (TRDRP) within the UC Office of the President. The Act also made California the model for a comprehensive state tobacco control program aimed at denormalizing the use of tobacco products.

In 2016, California voters approved Proposition 56, the California Healthcare, Research and Prevention Tobacco Tax Act. Proposition 56 increased the cigarette tax in California from $0.87 per pack to $2.87 per pack. This marked the first time since 1989 that cigarette taxes had been increased in California, and it positioned the state as having the ninth highest tax in the country, up from 35th. Proposition 56 revenues are distributed to certain state agencies to pay for implementation costs, with the remaining revenues distributed to other state agencies by a formula. TRDRP receives 5 percent of the remaining revenues after implementation costs. These new funds resulted in an eight-fold increase in the TRDRP budget and created new funding opportunities for researchers throughout the state of California.

Meeting New Challenges

The tobacco industry and, in turn, the field of tobacco control and research have changed dramatically since the last TRDRP Report to the California Legislature in 2015. New and emerging tobacco products are increasingly popular with populations disproportionately affected by tobacco product use, including youth and adolescents.[1] The introduction of Juul e-cigarettes and an ever-expanding array of vaping products and flavors by the tobacco industry has reversed California's successful reduction of teen tobacco use. In addition, the high nicotine content of these products has resulted in a new type of nicotine addiction that requires new research into evidence-based methods that can help prevent youth initiation and help young users end their dependence on these products.

The recent passage of SB 793 (Hill, Chapter 34, Statutes of 2020), which beginning January 1, 2021 will prohibit the sale of flavored tobacco products in California stores, including vapes and menthol cigarettes, is a critical step to protect the public's health. Three days after the bill was signed by Governor Newsom, a proposed referendum was submitted to the Attorney General of California by three individuals with ties to RJ Reynolds Tobacco. If this referendum qualifies for the ballot, SB 793 will be suspended until the referendum vote in the 2022 general election. As the legal battle over flavored tobacco products plays out, the physiological effects of the flavoring additives used in tobacco products remain unknown. TRDRP has funded researchers who are filling the gaps by analyzing the toxicology and health effects of these products and their flavorings. TRDRP continues to fund studies on the effects of nicotine itself, in both animal models and human subjects. TRDRP also has informed investigators that their research must quantify the actual chemical composition, including nicotine and

[1] The Centers for Disease Control and Prevention describes five key areas of social determinants that affect health: economic stability; education; neighborhood and built environment (i.e., the housing, environmental conditions, and safety of a person's neighborhood); health and health care; and social and community context (i.e., family structure, community civic participation, and perceptions of discrimination and equality).
See https://www.cdc.gov/tobacco/stateandcommunity/best-practices-health-equity/pdfs/bp-health-equity.pdf.

flavoring chemicals, in the substances they are testing. This information will help translate research findings into actionable data to inform state and local policy.

In 2016, voters approved Proposition 64, the Control, Regulate and Tax Adult Use of Marijuana Act, which legalized recreational use of marijuana for people age 21 and older. Marijuana, or cannabis, as it is also called, is frequently used together with tobacco in what is referred to as "blunts." In addition, tetrahydrocannabinol (THC), the chemical responsible for cannabis' hallucinogenic effects, is frequently mixed with nicotine in e-cigarettes. Despite this pervasive co-use, research is sparse about the health impacts of the co-use of cannabis and tobacco. Research on the biological and societal impact of the combined use of these products is needed to inform effective health policies. For this reason, TRDRP funds research that includes cannabis as it relates to tobacco use, tobacco policy, or tobacco-related disease. Prior to 2016, TRDRP had funded only four studies focused on both cannabis and cigarette smoking. As of May 2020, TRDRP has awarded $27,304,887 for 37 studies involving cannabis.

Overall, California has been remarkably successful in reducing combustible tobacco use. Adult smoking rates declined by 57.4 percent between 1988 and 2017 to a current rate of 10.1 percent — a reduction of about 2.8 million adults. However, adult smokers are disproportionately distributed across California's diverse population. The most recent statistics on demographics of adult tobacco use, published by our sister organization, California Tobacco Control Program (CTCP), in California Tobacco Facts and Figures 2019, show disparities across gender, sexual orientation, race and ethnicity, age, educational attainment, income, health insurance, housing type and community. Disparities are also seen among youth tobacco users, with higher tobacco use rates in LGBTQ, American Indian, and Pacific Islander high school students. To address these disparities, TRDRP has focused its largest research awards on projects that address tobacco-related health disparities and new and emerging tobacco products.

Pivoting to New Diseases

In March 2019, the U.S. Centers for Disease Control and Prevention (CDC) began receiving reports about patients, many in their teens and early 20s, with serious and, in some cases, deadly lung injuries. In California, the disease, now called E-cigarette or Vaping product use-Associated Lung Injury (EVALI), has affected people throughout the state, with 31 of 58 counties reporting cases. TRDRP-funded researchers were able to pivot quickly to address this new disease. One study, published in January 2020, found that lung injury symptoms have been reported online within vaping forums for at least seven years, suggesting that health problems experienced by vapers have been underreported or were not previously linked to vaping. TRDRP has funded additional studies into the effect of e-cigarettes on lung physiology and anticipates that this research will advance the understanding of the physiological effects of e-cigarettes.

When the COVID-19 pandemic surged in California, the UC Merced Nicotine and Cannabis Policy Center (NCPC), the first TRDRP-funded policy center, was quick to respond. NCPC, established in August 2018 to address tobacco and cannabis issues affecting communities in the San Joaquin Valley, was at the forefront of educating communities that smokers and former smokers may be more susceptible to COVID-19 and were more likely to get very sick and require intensive respiratory assistance. They also made the public aware that adults who breathed in secondhand smoke were at greater risk for COVID-19 because these exposures weaken the immune system, and make individuals more susceptible to the novel coronavirus.

TRDRP Grantmaking Practices: Strategic, Rigorous, and Agile

In 2014, TRDRP initiated a strategic planning process to reevaluate and update the program's funding priorities and mechanisms in ways that would better position the program to respond to new challenges and evolving biomedical and scientific advances. This process has guided TRDRP's grant making activities over the past five years.

Award Types and Research Priorities

In 2015, TRDRP revised its award types and research priority areas as part of a strategic planning process. Awards were expanded to include training and career development awards, as well as awards for exploratory/developmental research and more substantial research award mechanisms. The 2015-2020 research priority areas include the following:

- Tobacco-related health disparities,
- Neuroscience of nicotine addiction,
- Early diagnosis of tobacco-related cancers,
- Cardiopulmonary disease,
- Environmental exposure and toxicology, and
- State and local tobacco control policies and regulations.

Strategic Research Initiatives

TRDRP has invested $21.7 million since 2015 in thirty-five awards addressing four Strategic Research Initiatives (see table 2). These initiatives address gaps in federal funding and gaps in specific research topic areas. One of the most successful of these initiatives is the Thirdhand Smoke Consortium, which was first funded beginning in 2011 and has conducted groundbreaking research into the health effects of the residue left by indoor tobacco product use (see section 3.2.5 for more detail). Three examples of other new initiatives are as follows:

- A UC Natural Reserve System initiative to evaluate the environmental impact of tobacco and marijuana use in California funded in 2019.
- The Community Practice-Based Research (CPBR) initiative which funds collaborative health service research projects aimed at identifying clinical, structural, and organizational factors that contribute to or create barriers to the delivery of evidence-based tobacco cessation treatments for lower-income people enrolled in Medi-Cal. Medi-Cal patients make up the majority of the state's tobacco users funded in 2018.
- The Rapid Response Research to Accelerate Policy initiative, which supports teams of researchers who are working in partnership with advocates, community members, policymakers and other decision makers to identify and conduct research on emerging local tobacco policy issues and to disseminate the research findings for community benefit, funded in 2020.

A Focus on Community Engagement

Over the past five years, TRDRP has remained committed to ongoing efforts to disseminate findings from its research and initiatives to benefit communities throughout California. TRDRP has also created new opportunities to involve community-based organizations and community-level health clinics in the research process. TRDRP now requires that all applicants include a Community Engagement Plan in their grant proposals. Community members or community organizations can be involved at all stages of research, from development and implementation to dissemination.

Program Expansion

The passage of Proposition 56 in 2016 significantly expanded TRDRP funding, from an annual $7 million to $12 million from Proposition 99 to between $51 million and $87 million annually, allowing for increasing award levels and years of funding for all research award types (see table 3). TRDRP added additional funding cycles to meet the volume of applications for the increased funding, expanded the scope of research in key areas listed above, and added the following new research priorities:

- Oral diseases and dental health, and
- Other tobacco-related diseases.

Looking Forward

TRDRP's research priorities share the common objective of ending tobacco-related health disparities, assessing the health impacts of new and emerging tobacco products, and identifying health and behavioral effects of added flavors and nicotine. TRDRP has continuously encouraged and supported critical research needed to inform the state's tobacco control activities and improved the care for Californians with tobacco-related diseases. The fact that smoking prevalence remains highest among populations that are plagued by other health disparities means that TRDRP will continue to fund research in this area and to encourage new approaches that will result in reduced smoking prevalence for all. This is directly aligned with the cross cutting California Endgame Initiative, led by the California Tobacco Control Program, which seeks to end the sale and use of all tobacco products in the state by the year 2035.

To that end, TRDRP embarked on a new strategic planning process in 2019. The process culminated in these goals for the next five years:

- Serve as the leader in cutting-edge tobacco research by identifying and advancing innovative funding strategies that will drive policy and systems change;
- Utilize collaborative and interdisciplinary approaches to identify key research needs and to implement effective dissemination strategies for impactful tobacco control policymaking;
- Support communities most vulnerable to tobacco-related health disparities by providing real time, relevant, and actionable research findings to promote health equity and reduce negative impacts of tobacco in all California communities; and,
- Strive for excellence in the stewardship of grants and grantmaking operations by leveraging key partnerships, evaluating and improving processes and procedures, and enabling staff development.

These goals will better enable TDRDP to provide the State of California with the timely, informative data it needs to support tobacco control efforts and improved health for all Californians.

1.1 Required Reporting Elements

This report has been prepared by the University of California, pursuant to California Health and Safety Code, Section 104500(c). The following required reporting elements are addressed in this report:

1.1.1 The number and total dollar amounts of funded and pending research grants, including the amount allocated to indirect costs.

From July 1, 2015, through June 30, 2020, TRDRP awarded nearly $200 million for 380 research projects. As of July 1, 2020, TRDRP approved nearly an additional $50 million in funding for 129 new grants. Information about the grants awarded in each research priority area and by fiscal year is shown in Tables 1 and 2.

Table 1: TRDRP Research Awards Committed to Fund from July 1, 2015 to June 30, 2020 by Priority Area

PRIORITY AREA	NUMBER OF PROJECTS	AMOUNT FUNDED	PERCENT OF DOLLARS FUNDED
Social and behavioral prevention and treatment	105	$55,757,654	23.1%
Cancer prevention, treatment, and biology	114	$44,650,467	18.5%
Environmental exposure and toxicology	67	$41,369,372	12.5%
Cardiovascular and cerebrovascular diseases	62	$30,065,264	17.1%
State and local tobacco control policy research	41	$22,353,954	8.1%
Pulmonary biology and lung diseases	39	$21,189,114	2.4%
Neuroscience of nicotine addiction and treatment	35	$19,491,676	8.8%
Oral diseases and dental health	13	$5,714,138	9.3%
COVID-19 emergency seed funding	33	$815,805	0.3%
TOTALS	509	$241,407,444	100%

Table 2: ***Project Commitments 2016 – 2020, by Fiscal Year***

FISCAL YEAR	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019[1]**		**2019-2020[1]**		**5 YEAR SUMMARY**	PENDING GRANTS[4]	**GRAND TOTAL**
GRANT CYCLE	**24**	**25**	**26**	**27**	**28**	**29**	**30**		31	
INDEPENDENT INVESTIGATOR-INITATED AWARDS	23	21	46	43	47	42	27	249	91	340
Direct Costs	$6,850,144	$5,694,290	$12,256,828	$24,609,412	$29,697,366	$22,704,938	$14,177,422	$115,990,400	$29,790,342	$145,780,742
Indirect Costs[2]	$2,328,953	$2,296,166	$4,747,001	$8,600,010	$10,118,837	$7,338,769	$5,742,758	$41,172,494	$12,119,719	$53,292,213
Total Grant Costs	$9,179,097	$7,990,456	$17,003,829	$33,209,422	$39,816,203	$30,043,707	$19,920,180	$157,162,894	$41,910,061	$199,072,955
TRAINEE INVESTIGATOR-INITIATED AWARDS	7	8	3	12	16	21	29	96	31	127
Direct Costs	$468,550	$662,666	$330,000	$2,004,585	$2,255,768	$3,100,453	$4,463,840	$13,285,862	$4,991,872	$18,277,734
Indirect Costs[2]	$33,452	$53,025	$17,744	$67,959	$0	$0	$0	$172,180	$0	$172,180
Total Grant Costs	$502,002	$715,691	$347,744	$2,072,544	$2,255,768	$3,100,453	$4,463,840	$13,458,042	$4,991,872	$18,449,914
SPECIAL INITIATIVE AWARDS[3]	12	3	2	3	13	2	0	35	7	42
Direct Costs	$975,794	$635,442	$10,000	$1,155,000	$13,782,426	$493,210	$0	$17,051,872	$1,588,819	$18,640,691
Indirect Costs[2]	$244,387	$129,481	$750	$696,482	$3,606,478	$43,772	$0	$4,721,350	$522,534	$5,243,884
Total Grant Costs	$1,220,181	$764,923	$10,750	$1,851,482	$17,388,904	$536,982	$0	$21,773,222	$2,111,353	$23,884,575
TOTAL PROJECTS FUNDED	42	32	51	134		121		380	129	509
Total Direct Costs	$8,294,488	$6,992,398	$12,596,828	$73,504,557		$44,939,863		$146,328,134	$36,371,033	$182,699,167
Total Indirect Costs[2]	$2,606,792	$2,478,672	$4,765,495	$23,089,766		$13,125,299		$46,066,024	$12,642,253	$58,708,277
Total Funds Disbursed	$10,901,280	$9,471,070	$17,362,323	$96,594,323		$58,065,162		$192,394,158	$49,013,286	$241,407,444

[1] The number of grant cycles per year increased from one to two during the first two years of Prop 56 funding.

[2] Indirect cost rates are negotiated by an individual institution with their federal counterpart. Non-UC institutions may charge TRDRP their federal indirect cost rate while UC institutions are limited to 30% IDC rate per UC policy. Indirect costs are used to fund grant administrative services, lab operations, and maintenance, depreciation, and debt services taken on for new construction to provide researchers with modern facilities. Beginning in grant cycle 28, TRDRP disallowed institutions to charge indirect costs on predoctoral and postdoctoral awards. This is consistent with the practice of the National Institutes of Health Ruth L. Kirschstein National Research Service Awards (Kirschstein-NRSA).

[3] Special Initiative awards include special projects, conference awards, policy centers, thirdhand smoke consortium, environmental impacts of tobacco & cannabis pilot award, community partnered participatory research grants, and community practice-based grants.

[4] Grants for Cycle 31 have been committed, not yet paid, and include COVID-19 Emergency Seed Awards.

1.1.2 Lists of funded grants, including investigators, institutions, project titles, and total funds awarded

Section 2 of the report includes descriptions of a selection of grants. Appendix II provides a list of all grants awarded during the period covered by this report. Since its inception, TRDRP has overseen 31 grant cycles and funded close to 2,000 research grants totaling over $650 million to investigators who have advanced the research field, informed innovative evidence-based treatment and prevention efforts, enhanced tobacco control efforts, and addressed the health and economic consequences of tobacco use.

1.1.3 Program accomplishments

Section 2.3 of the report covers the accomplishments of the program over the past five years with an emphasis on how these accomplishments have supported the goals set out by the Tobacco Education and Research Oversight Committee (TEROC) in its 2016 and 2018 Master Plans. Research conducted by TRDRP Grantees has provided evidence used to inform the Proposition 56 legislation, which instituted a $2 tax increase on tobacco products as well as SB793 which prohibits the sale of flavored tobacco products in California stores, including vapes and menthol cigarettes.

1.2 TRDRP Financial Tables

TRDRP funds high quality, innovative research that advances knowledge needed to improve tobacco control and the prevention and treatment of tobacco-related diseases. Proposition 99 and Proposition 56 income that made these grants possible is shown in Table 3, while Table 4 details the operational expenses incurred.

Table 3: TRDRP Income 2015-2020

FISCAL YEAR	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	5 YEAR SUMMARY
Allocation (Proposition 99)	$10,133,000	$12,939,000	$10,149,000	$7,407,000	$11,436,000	$52,064,000
Allocation (Proposition 56)	-	-	$81,956,000	$57,754,466	$58,200,368	$197,910,834
REVENUE TOTAL	$10,133,000	$12,939,000	$92,105,000	$65,161,466	$69,636,368	$249,974,834

Table 4: Expenditures for Administration and Program Support, 2015-2020

FISCAL YEAR	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	5 YEAR SUMMARY
Administration	$441,611	$418,873	$571,170	$783,724	$665,959	$2,881,337
% total funds*	2%	2%	1%	1%	1%	1%
Research Evaluation and Dissemination	$1,032,898	$971,517	$2,251,541	$2,371,500	$2,401,621	$9,029,077
% total funds*	4%	4%	3%	4%	4%	4%

* This is calculated as a percent of the total revenue in Table 3.

2 Origin, Evolution and Impact

2.1 Origin and Mission of TRDRP

Thirty-two years ago, California voters transformed the state's tobacco control efforts with the passage of Proposition 99, the California Tobacco Health Protection Act of 1988. The Act instituted a 25¢ per pack cigarette surtax, and designated 5 percent of revenues ($0.0125 per pack) to be dedicated to tobacco control research and tobacco-related disease research. In the 2019-20 fiscal year, this amounted to $11.4 million. The Act also made California the model for a comprehensive state tobacco control program aimed at denormalizing the use of tobacco products.

The Cigarette and Tobacco Products Surtax Fund consists of six accounts in which specific percentages of the revenue collected through the Tobacco Health Protection Act of 1988 are deposited annually (Figure 1). The funds are dedicated to tobacco-related research supports studies on the prevention and treatment of tobacco-related diseases in California. This includes research in biomedical sciences, nicotine dependence, epidemiology, social behavioral science, and policy. More recently, it also has encompassed research directed at identifying harms associated with new and emerging tobacco products, addressing the adolescent vaping epidemic, and investigating the public health impact of the legalization of cannabis in California.

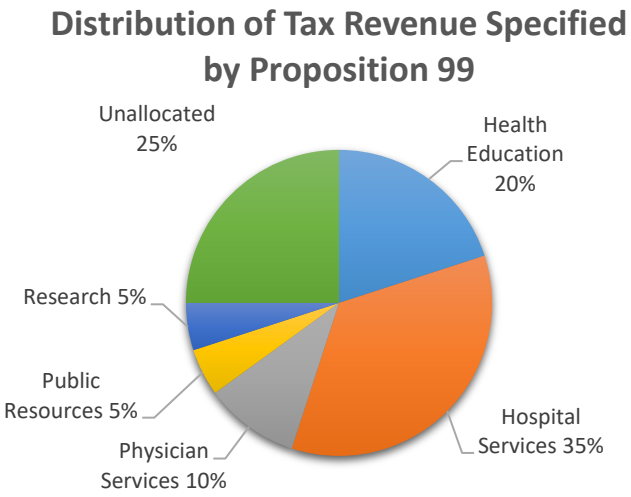

Figure 1: TRDRP receives 5 percent of revenue from Proposition 99

Proposition 99 mandated the creation of a Tobacco Education and Research Oversight Committee (TEROC) to lead and oversee tobacco prevention efforts in California funded by the surtax. Three state agencies receive funding to carry out these efforts:

- California Department of Public Health, which directs its efforts through its California Tobacco Control Program;
- California Department of Education, which instituted a Tobacco-Use Prevention Education Program; and
- University of California Office of the President, which houses TRDRP within its Research Grants Program Office (RGPO) in Oakland.

Per legislative mandate[2], the revenues from the research account are administered by the University of California. The University established TRDRP to oversee and coordinate the research program. TRDRP's aim is to reduce the human and economic costs of tobacco use through innovative research and dissemination of those results.

[2] Revenue and Taxation Code Sections 30122(b), 30123, and 30124

2.1.1 Proposition 56: Tobacco Tax Increase Initiative

In 2016, California voters approved Proposition 56, the California Healthcare, Research and Prevention Tobacco Tax Initiative. Proposition 56 increased the cigarette tax in California from $0.87 per pack to $2.87 per pack. This marked the first time since 1989 that cigarette taxes had been increased in California, and it positioned the state as having the ninth highest tax in the country, up from 35th.

The University of California receives funds from Proposition 56 through a multi-step formula that is overseen by the California Department of Tax and Fee Administration. A percentage or fixed dollar amount of Proposition 56 funds are first distributed to five state agencies to pay for implementation costs. The University of California receives $40 million per year from this allocation to increase the number of physicians trained and working in California. The remaining revenues are distributed to other state agencies, including 5% to TRDRP to fund research into tobacco-related diseases.[3] These new funds resulted in an eight-fold increase in TRDRP's program budget and created new funding opportunities for researchers throughout the state of California. The increased funding from Proposition 56 permitted TDRDP to increase total award commitments from $17,100,772 in FY 2017-18 to $96,594,323 in FY 2018-19.

TRDRP quickly built upon its decades of expertise to scale up its grantmaking programs in response to the additional revenue. Importantly, under the guidance of the Research Grants Program Office (RGPO), TDRDP introduced a second application cycle in FY 2018-19. Providing two grant cycles each year allowed researchers to respond quickly to new developments in tobacco use, such as vaping and tobacco co-use with cannabis.

2.1.2 Setting the Research Agenda

TRDRP funds both UC campuses and non-UC institutions through a competitive peer review process that distributes funds based on scientific and programmatic merit. TDRDP has remained nimble and responsive, most recently by focusing its most substantial awards, the Research Project Awards, to tobacco-related health disparities and new and emerging tobacco products.

The Research Project Awards that focus on health disparities study tobacco-related diseases, tobacco product use, industry marketing, and tobacco-related policies that affect priority populations whose tobacco use often aggravates other social, economic, and health disparities. These groups include individuals who are:

- Current members of the military and veterans;
- Employed in blue-collar jobs, agriculture, and the service industry;
- School-aged youth and young adults;
- Incarcerated and formerly incarcerated individuals;
- Pregnant or breastfeeding;
- Racial/ethnic minorities;
- Rural residents; and
- Sexual/gender minorities.

These groups also include individuals who have:

- Mental illness or substance use disorders,
- Low socioeconomic status,
- Disabilities, and
- Limited education.

[3] Revenue and Taxation Code Section 30130.55 and 30130.57

TRDRP's Research Awards also made it possible for tobacco researchers to quickly ramp up their research on the social, economic, and health impacts of new and emerging tobacco products, such as electronic (e)-cigarettes, and heated tobacco products such as iQOS and hookah. These products have quickly and dramatically eroded the state's decades-long efforts to prevent California's youth from developing addictions to nicotine. With these grants, researchers are providing insight into, for example, the following:

- How emerging tobacco products affect the lungs,
- The way cartoon-based marketing strategies for e-cigarettes draw in adolescents,
- Fetal nicotine exposure through e-cigarettes,
- Transgenerational asthma induced by parental tobacco product use,
- How alternative tobacco products and alcohol lead to cancer-causing mutations, and
- The health effects of secondhand and thirdhand e-cigarette aerosol.

2.1.3 Proposition 64: Responding to Cannabis legalization

In 2016, voters approved Proposition 64, the Control, Regulate and Tax Adult Use of Marijuana Act, which legalized recreational use of marijuana for Californians age 21 and older. Tobacco educators and researchers recognized this legislation would directly affect tobacco prevention efforts, and in its 2018-2020 Master Plan, the TEROC directed TRDRP to "study the health consequences of the exclusive, combined and co-use of new tobacco products and cannabis." This included rigorous scientific research into the social and policy consequences of combusted and aerosolized cannabis and its impact on the health of Californians in general and priority populations in particular, including potential increased risks for lung disease, heart disease, and cancer as well as possible health benefits. Prior to 2016, TRDRP had funded only four studies focused on both cannabis and cigarette smoking. As of May 2020, TRDRP has awarded $30,810,516 for 40 studies involving cannabis (see Table 15). These studies are investigating topics such as the following:

- Impact of tobacco and cannabis on environmental pollution;
- Effects of cannabis and tobacco use on fetal development;
- Tobacco legislation and its impact on cannabis and nicotine co-use;
- Long-term impact of cannabis exposure on the adolescent brain;
- Second and thirdhand exposure to tobacco, e-cigarettes, and cannabis in multi-unit housing; and
- Effects of nicotine, e-cigarettes, and cannabis on the gut.

TRDRP also helped support and plan the North American Cannabis Summit, a three-day conference held in Los Angeles in January 2019 that brought together more than 600 participants from six countries to discuss the rigorous research necessary to develop evidence-based approaches to cannabis public policies and practices.

2.2 Evolution of Tobacco Control & Challenges

The tobacco industry and, in turn, the field of tobacco control and research has changed dramatically since TRDRP's last Report to the California Legislature in 2015. The introduction of e-cigarettes, such as Juul, and an ever-expanding array of vaping products and flavors by the tobacco industry has reversed California's successful reduction of teen tobacco use. The high nicotine content of these products has resulted in a new type of nicotine addiction that requires new research into identifying the evidence-based methods that can help youth stop using these products. Vaping and its use together with cannabis (co-use) also lead to a dangerous newly identified lung disease: E-cigarette or Vaping product use-Associated Lung Injury, or EVALI.

Nationwide, the increase in adolescent vaping from 2017 to 2018 seen in the annual Monitoring the Future survey[4] was the largest recorded in the past 43 years for any adolescent substance use, with the percentage of 12th grade students who reported vaping nicotine in the past 30 days nearly doubling, from 11 percent to 21 percent. This translates to one in five 12th grade students vaping nicotine in the last 30 days. Nicotine vaping also increased dramatically among 10th grade students, doubling from 8 percent to 16 percent, the largest percentage point increase ever seen in this survey; among 8th graders, numbers increased from 3.5 percent to 6.1 percent. This totals to at least 1.3 million more students vaping nicotine in 2018 than in 2017. Over the next year, the percentage of student vapers continued to rise, with the Monitoring the Future survey finding 25.5 percent of 12th graders, 19.9 percent of 10th graders and 9.6 percent of 8th graders reporting vaping nicotine in 2019 (figure 2).

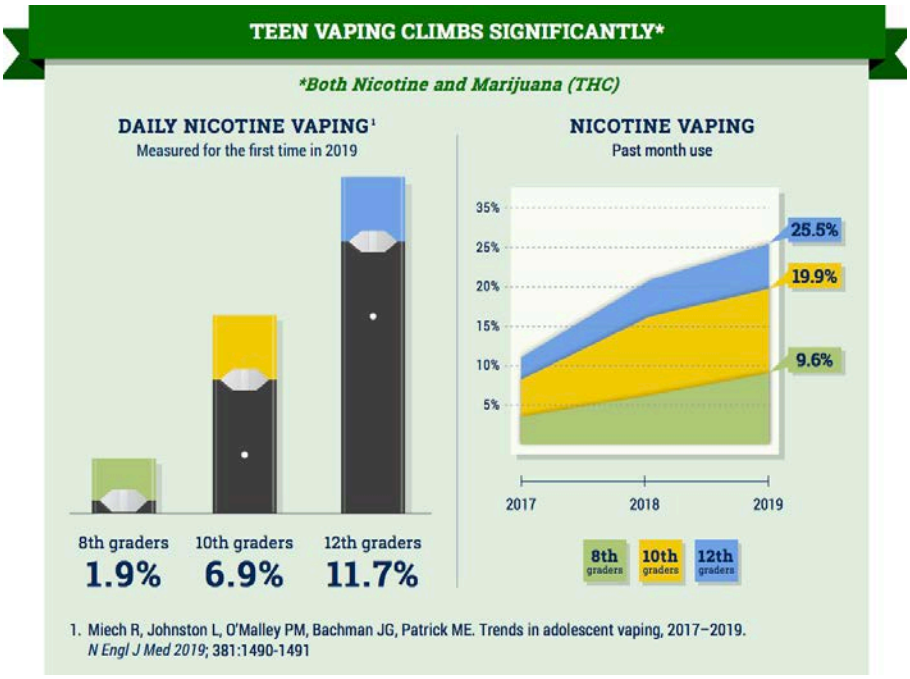

Figure 2: Teen nicotine vaping has increased over the past several years (source: Centers for Disease Control and Prevention)

Research has shown the vaping epidemic among youth has been fueled by the sweet, child-friendly flavors developed and marketed by e-cigarette manufacturers. The 2009 Family Smoking Prevention and Tobacco Control Act banned flavors other than menthol in cigarettes, but not in other types of tobacco products. E-cigarette manufacturers used this loophole to their advantage, and began marketing flavors such as cotton candy, gummy bear, and chocolate. A study published in 2017 in the American Journal of Preventive Medicine that investigated flavored tobacco product use in close to 46,000 U.S. youth and adults found that 81 percent of youth who vape and 86 percent of young adults who vape reported their first product was flavored. The study also found that for both youth and adults, being introduced to tobacco through a flavored product resulted in more tobacco use. Among youth who use flavored tobacco products, a 13 percent higher prevalence of current tobacco use was seen; for adults, there was a 32 percent higher prevalence of current tobacco use.

[4] The Monitoring the Future survey has measured drug and alcohol use and related attitudes among adolescent students nationwide since 1975. The survey is funded by the National Institute on Drug Abuse (NIDA), a component of the National Institutes of Health (NIH), and is conducted by the University of Michigan.

Figure 3. Tobacco use rate among California by age group and product type, 2016-17

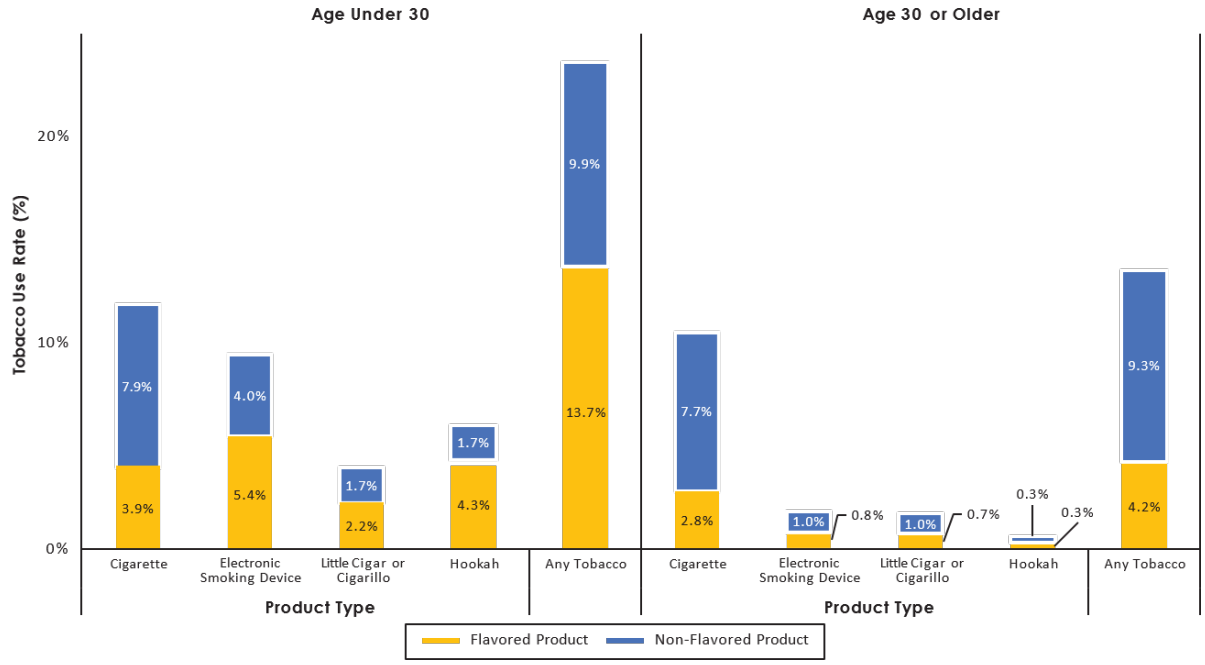

Figure 3: Use of flavored tobacco products in youth is much higher in youth than adults. Note: Cigarette and electronic smoking device use are based on self-reported current use. Cigar (not shown), hookah, little cigar or cigarillo, and smokeless tobacco (not shown) use are based on self-reported past 30-day use. Any tobacco use is based on current use of cigarette or electronic smoking device or past 30-day use of cigar, hookah, little cigar or cigarillo, hookah, or smokeless tobacco. Source: Behavioral Risk Factor Surveillance System, 2016-17. Sacramento, CA: California Department of Public Health; October 2018. California Tobacco Facts and Figures 2019

California is no exception. A study funded by TRDRP published in *Pediatrics* in 2019 by researchers at the USC Tobacco Center of Regulatory Science, found that teenagers who vaped nontraditionally flavored e-cigarettes, including mint and menthol, were more likely to continue vaping than were teens who used flavorless e-cigarettes or traditional cigarette flavors. The senior author of this study received a Research Award from TRDRP in 2018 to investigate whether vaping attracts a broad segment of low-risk youth and young adults into nicotine or cannabis use and leads to regular use of these products.

2.2.1 Public Policy Advances

The federal government has been the primary entity responsible for e-cigarette regulation. However, new product development has been outpacing regulations that could limit youth use of nicotine products. The U.S. Food and Drug Administration (FDA) officially took over authorization for marketing approval for all electronic nicotine delivery systems (ENDS), such as e-cigarettes, on August 8, 2016. At that time, the FDA said it would prioritize its regulatory efforts on flavored, cartridge-based products (other than a tobacco- or menthol-flavored ENDS product) that had not submitted a premarket tobacco product application. However, it was not until rates of adolescent use of e-cigarette products continued to skyrocket that the FDA responded to public calls for better control of these products.

In February 2020, new FDA regulations went into effect that banned all flavored vaping cartridges other than menthol or tobacco. However, the ban did not include flavored nicotine products for open tank devices, such as Puff Bar, which began to gain popularity among youth as Juul cut back on its flavored nicotine. A study by the FDA's Center for Tobacco Products and the U.S. Centers for Disease Control and Prevention (CDC)'s Office on Smoking and Health published in the Journal of the American Medical Association in November 2019 found that these products were gaining in popularity among high school students.

Over the past five years, the state of California has taken important steps to curb teen use of tobacco products. On June 9, 2016, California became the second state in the country to make 21 the minimum age to purchase tobacco, e-cigarettes, and vaping products. Three years later, on December 20, 2019, President Trump signed legislation that made it illegal for tobacco products to be sold to anyone under 21 throughout the country.

Although the FDA heeded calls to regulate these products and ban flavors that attract youth, it did not regulate the flavor that continues to drive health disparities in tobacco use: menthol. Banning all flavors other than menthol disproportionately affects Black communities. It is widely recognized that the tobacco industry has historically — and continues to — aggressively market menthol cigarettes and other menthol-flavored tobacco products to the Black community. Studies show that 7 out of 10 Black youth who use tobacco use smoke menthol cigarettes, and that Black adults are more likely to smoke menthol cigarettes than adults of other racial or ethnic groups.

Following the example of the Beverly Hills City Council, which in June 2019 voted to outlaw sales of most tobacco products, cities may be considering similar actions. The Beverly Hills City ordinance—believed to be the first in the country—goes into effect in 2021 and will prohibit the sale of any nicotine product in gas stations, convenience stores, pharmacies, and grocery stores. An evaluation of California's Tobacco 21 law by the California Tobacco Control Program and the Institute for Population Health Improvement at the University of California concluded that campaigns to raise Californian's awareness that the minimum age to purchase tobacco had been raised from 18 to 21 appeared to have reduced illegal tobacco sales to youth under 18.

2.2.2 Tobacco-Related Health Disparities

Tobacco use increases a person's risk of developing or dying from cancer and diseases that affect the heart and lungs. Symptoms and side effects of these diseases or their treatments can reduce quality of life, limit employment opportunities, and have devastating financial impacts. Overall, California has been remarkably successful in reducing tobacco use. Adult smoking rates declined by 57.4 percent between 1988 and 2017 to a current rate of 10.1 percent — or about 2.8 million adults (Figure 4).

Figure 4. Cigarette smoking rate among California adults, 1988 to 2017

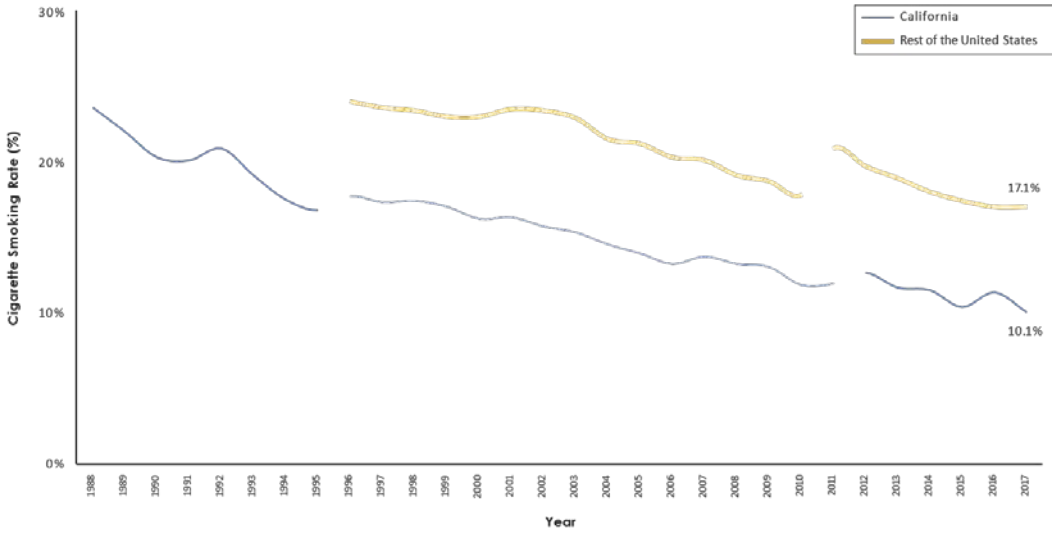

Figure 4: California leads the nation in reducing cigarette smoking Note: Restricted to respondents aged 18 or older. Cigarette use is based on self-reported current use. A break in the trend line is shown for California data between 1995 and 1996 and between 2011 and 2012 due to methodological change. A break in the trend line is shown for the Rest of the United States data between 2010 and 2011 due to methodological change. Source: (1) Behavioral Risk Factor Surveillance System, 1988 to 2017. Sacramento, CA: California Department of Public Health; October

2018. (2) Behavioral Risk Factor Surveillance System, 1996 to 2017. Atlanta, GA: Centers for Disease Control and Prevention; October 2018, California Tobacco Facts and Figures, 2019

But these 2.8 million adults do not uniformly reflect California's population. The most recent statistics on adult and youth cigarette use demographics (figure 5) show disparities across gender, sexual orientation, race and ethnicity, age, educational attainment, income, health insurance, housing type and community.

Figure 5. Cigarette smoking among California adults by demographics, 2016-17

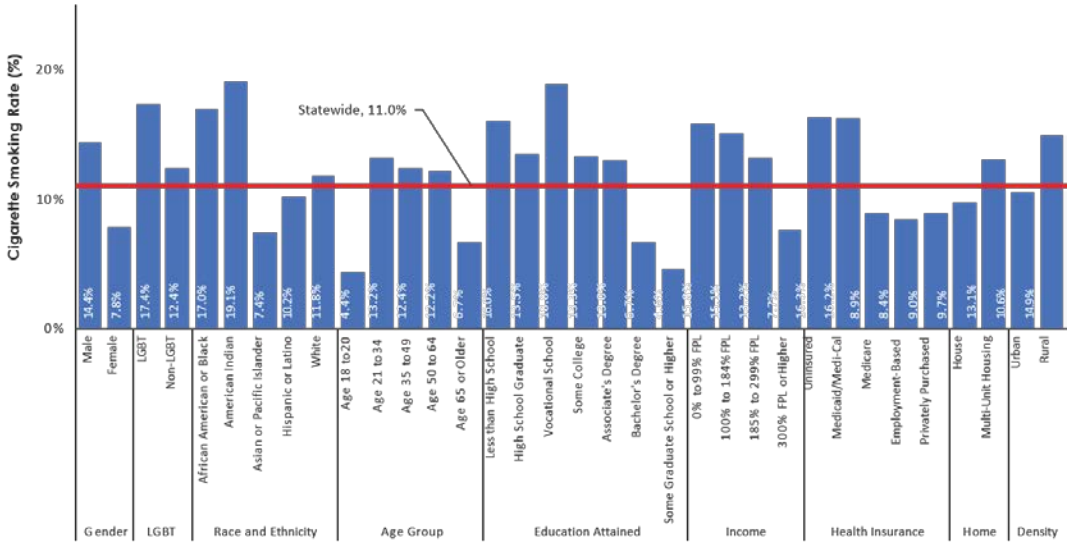

Figure 5: Cigarette Smoking is much higher among ethnic, gender and racial minorities and among rural and people with a low socioeconomic status. (source: California Tobacco Facts and Figures 2019)

Disparities are also seen among youth tobacco users, with higher tobacco use rates seen in LGBTQ, American Indian, and Pacific Islander high school students (figure 6).

Figure 6. Tobacco use rate among California youth by demographics, 2018

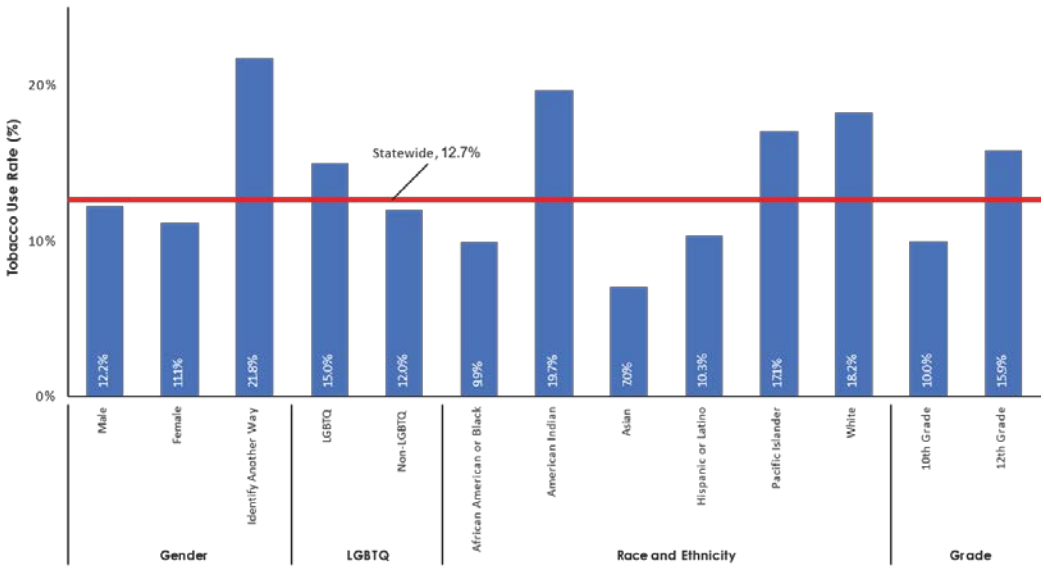

Figure 6: Tobacco use disparities also exist among California youth. Note: Restricted to respondents aged 18 or older, except for LGBT status, which is restricted to respondents aged 18 to 70 (the statewide rate for aged 18 to 70 is 11.8 percent). Cigarette use is based on self-reported current use. The race and ethnicity categories are non-Hispanic or Latino unless otherwise noted. American Indian includes Alaska Native. Asian or Pacific Islander includes Native Hawaiian. LGBT refers to lesbian, gay, bisexual, or transgender. FPL refers to the Federal Poverty Level. Rural is based on definition from the Nielsen Consumer Activation, where the population density is fewer than 1,000 persons per square mile. Source: California

Health Interview Survey, 2016-17. Los Angeles, CA: UCLA Center for Health Policy Research; October 2018, California Tobacco Facts and Figures 2019.

Geographical differences in smoking rates are also reflected in these statistics. As this map of California makes clear (figure 7), not all regions of the state experience the same level of tobacco use, creating health disparities that can devastate individuals, families, communities, and economies.

Figure 7. Cigarette smoking rate among California adults by geographic regions, 2015-17

County	Rate	County	Rate
Alameda	10.0%	Orange	10.5%
Alpine	15.3% (a)	Placer	10.2%
Amador	15.3% (a)	Plumas	20.3% (b)
Butte	17.3%	Riverside	11.8%
Calaveras	15.3% (a)	Sacramento	13.6%
Colusa	19.8% (c)	San Benito	10.6%
Contra Costa	11.8%	San Bernardino	14.4%
Del Norte	20.3% (b)	San Diego	11.1%
El Dorado	14.6%	San Francisco	11.0%
Fresno	14.9%	San Joaquin	11.6%
Glenn	19.8% (c)	San Luis Obispo	11.8%
Humboldt	16.9%	San Mateo	9.3%
Imperial	11.4%	Santa Barbara	9.6% (e)
Inyo	15.3% (a)	Santa Clara	7.8%
Kern	16.1%	Santa Cruz	13.4%
Kings	15.5%	Shasta	19.4%
Lake	25.1%	Sierra	20.3% (b)
Lassen	20.3% (b)	Siskiyou	20.3% (b)
Los Angeles	11.0%	Solano	14.5%
Madera	16.1%	Sonoma	12.3% (d)
Marin	8.7%	Stanislaus	17.1%
Mariposa	15.3% (a)	Sutter	13.9%
Mendocino	15.9%	Tehama	19.8% (c)
Merced	14.7%	Trinity	20.3% (b)
Modoc	20.3% (b)	Tulare	10.4%
Mono	15.3% (a)	Tuolumne	15.3% (a)
Monterey	11.7%	Ventura	9.6% (e)
Napa	12.3% (d)	Yolo	5.6%
Nevada	15.6%	Yuba	22.4%

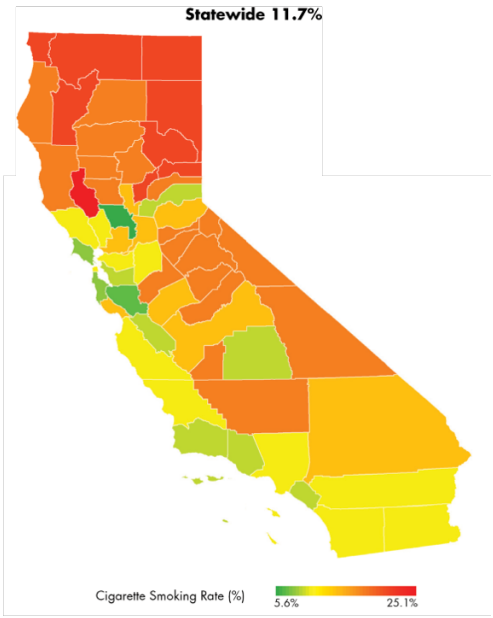

Figure 7: Higher rates of smoking are found in rural counties. Note: Restricted to respondents aged 18 or older. Cigarette use is based on self-reported current use. Several counties were categorized together to produce stable estimates: (a) Alpine, Amador, Calaveras, Inyo, Mariposa, Mono, Tuolumne; (b) Del Norte, Lassen, Modoc, Plumas, Sierra, Siskiyou, Trinity; (c) Colusa, Glenn, Tehama; (d) Napa, Sonoma; and (e) Santa Barbara, Ventura. Source: California Health Interview Survey, 2015-17. Los Angeles, CA: UCLA Center for Health Policy Research; February 2019, California Tobacco Facts and Figures 2019

Addressing tobacco-related health disparities requires a multi-pronged approach. TRDRP's Community Practice-Based Research Planning and Implementation Awards provide two interconnected avenues for establishing, building, and putting into practice long-term partnerships between academic researchers and health care practitioners. Such partnerships can be more effective than academics conducting research on their own at identifying the system-level change approaches and quality care improvements necessary to address patient tobacco use and successfully support cessation. More detail can be found in section 2.3.3.

The ultimate goal of tobacco prevention and cessation interventions is to keep people from developing tobacco-related diseases, which kill more than 40,000 Californians every year. Tobacco use is the leading cause of cancer diagnoses and deaths, and it has the greatest impact on the lives of the priority populations and communities whose health is most impacted by tobacco use.

Smoking is also a leading cause of heart disease and stroke. It is also a leading cause of lung diseases like chronic obstructive pulmonary disease (COPD). TRDRP research will help the tens of thousands of people currently living in California with these heart and lung diseases, who are disproportionately women, people who are multiracial non-Hispanic or American Indians/Alaska Native, and people who have a low socioeconomic status.

2.2.3 New Diseases Associated with Vaping

In March 2019, the CDC began receiving reports from doctors throughout the country of patients, many in their teens and early 20s, with serious and, in some cases, deadly lung injuries. The first cases were identified in Wisconsin, but soon they were seen in California along with every other state in the U.S. As of February 18, 2020, 2,807 people had been hospitalized with or had died from the disease, now called E-cigarette or Vaping product use-Associated Lung Injury, or EVALI. The California Department of Public Health reported 210 cases of EVALI as of March 23, 2020, and 4 deaths. The disease affected people throughout the state of California, with 31 of 58 counties reporting cases. Although 10 percent of EVALI patients reported vaping nicotine only, the majority of patients reported vaping the psychoactive component of cannabis, tetrahydrocannabinol (THC), either alone or in conjunction with nicotine. Ultimately, investigators from the CDC reported that vitamin E acetate, an additive to THC-containing e-cigarette, or vaping, products was strongly linked to the outbreak. However, the CDC also could not definitively say that other chemicals used in vaping liquids might not also be contributing factors.

TRDRP-funded researchers were able to pivot quickly to address this new disease. One study, published in January 2020, in the *Journal of Medical Internet Research*, analyzed posts on online fora on the health effects of electronic cigarettes. The researchers found that vaping-related lung injury symptoms have been reported online for at least seven years, suggesting that previous health problems experienced by vapers have been unreported or not linked to vaping. These findings give important context to the EVALI outbreak. They also illustrate that internet data mined to monitor and track how tobacco products affect the health of their users, can potentially identify new illnesses as they emerge.

As the COVID-19 pandemic exploded in the U.S., policy centers established with TRDRP funding provided an infrastructure to quickly support and educate the communities they serve on how to protect themselves from this new disease. The UC Merced Nicotine and Cannabis Policy Center (NCPC) published a report "Tobacco Control is a Critical Component of COVID-19 Management" that explained why smokers and former smokers may be more susceptible to COVID-19 and are more likely to get very sick and require intensive respiratory assistance if they contract the disease. The NCPC educational materials that accompanied the report also made the public aware that children and adults who breathed in secondhand smoke were at greater risk for COVID-19, because these exposures weaken the immune system and the body's natural defenses against viruses, such as the novel coronavirus (figure 8).

Figure 8: NCPC educational materials highlight the harm of second hand smoke on the immune system (https://ncpc.ucmerced.edu/sites/ncpc.ucmerced.edu/files/page/documents/covid_kids_english.pdf)

Cutting-edge tobacco control research must continually respond to new developments in tobacco and nicotine use and addiction. New strategies used by TRDRP, such as implementation science and precision medicine, reflect our understanding that, to improve tobacco control within the specific groups that remain most affected by tobacco use, tobacco cessation programs will need to be not only integrated into community health systems but also supported by the communities these health systems serve. To support these efforts, TRDRP re-envisioned the program's research agenda in ways that emphasize the health and social needs of the communities throughout California that continue to be aggressively targeted by the tobacco industry and face the greatest health burdens of tobacco use.

2.3 Impact of TRDRP Activities on TEROC Goals

The State of California Tobacco Education and Research Oversight Committee (TEROC) was established in 1995 by Health and Safety Code 104365. TEROC is mandated to create a Master Plan every three years to guide tobacco control efforts, tobacco use prevention education, and tobacco-related disease research throughout the state. Over the past five years, TRDRP developed programs and engaged in activities designed to address the objectives and strategies TEROC identified in its 2015-2017 and 2018-2020 Master Plan cycles.

In response to the changing nature of tobacco use in California, TEROC updated its goal for the 2015-2017 three-year Master Plan cycle. The previous goal was to reduce cigarette smoking prevalence throughout California; the new goal set specific targets for reducing prevalence rates of use by adults and youth of all types of tobacco products, including e-cigarettes. Each Master Plan delineated seven specific objectives critical to countering the threats tobacco use poses to the health of all Californians. Listed below are specific TRDRP-funded research and activities aimed at meeting or exceeding these objectives.

2.3.1 Raise the Tobacco Tax

This objective was met in 2016 with the passage of Proposition 56, The Tobacco Tax Increase Initiative, which increased the cigarette tax in California from 0.87 per pack to $2.87 per pack. TRDRP funded research that helped policy makers and the public understand the multiple ways this tax would affect the lives and health of youth and adults throughout the state.

Jennifer Unger, Ph.D., of the University of Southern California, received a Special Projects grant to assess the public's opinion on regulation and taxation of e-cigarettes by adding five questions to the Field Survey of 1,000 registered California voters. The results of the Field Poll, which was conducted in September 2015 and published in 2016 in *Tobacco Control*, showed that 74 percent of those surveyed supported taxing e-cigarettes. In addition, 74 percent of those surveyed supported requiring licensing for e-cigarette retailers, while 57 percent supported restricting flavorings.

To address the question of whether only certain racial or ethnic groups would respond to an increase in cigarette prices by reducing the number of cigarettes smoked per day, TRDRP funded Hai-Yen Sung, Ph.D., at the University of California, San Francisco, to investigate the impact of cigarette prices on the smoking behavior of adult smokers of different racial and ethnic backgrounds. The findings, published in 2016 in Tobacco Control, showed that raising cigarette prices would result in reduced cigarette consumption for all racial and ethnic groups.

Wendy Max, Ph.D., and James Lightwood, Ph.D., at the University of California, San Francisco, received an award to investigate the impact of a cigarette tax on healthcare expenditures in California. The economic analyses included in this research showed that a $2.00 per pack increase in the tobacco excise tax in California would be expected to reduce smoking prevalence by more than 2 percentage points from 9.4 percent to 7.1 percent in 2020, resulting in a cumulative savings in healthcare expenditures of $4.1 billion between 2017 and 2020. The analysis of the most recent data on tobacco product use in California is ongoing; thus, it is too early to tell whether these predictions will be borne out.

TRDRP-funded research into the impact of the tax continues. Dr. Sung received an award to investigate the impact of the new tax on smoking prevalence, intensity, and total cigarette consumption among low-income Californians. Dr. Sung is also studying the tax's impact on healthcare costs attributable to cigarette smoking and the amount paid by Medi-Cal and Medicare for low-income Californians. This research will help us understand the extent to which the tobacco tax helped narrow the gap in smoking prevalence between low-income and high-income Californians.

2.3.2 Vigorously Protect and Enhance Tobacco Control Capacity in California / Build Capacity to Deliver on the Promise of a Smoke- and Tobacco-Free California

Over the past five years, TRDRP funded programs that would maintain and bolster the state, regional, and local partnerships essential to a comprehensive tobacco control effort. This work was solidified by the conference "Tobacco Control, Research and Education: Joining Forces to Address New Challenges," co-sponsored by TRDRP, the California Department of Education, Tobacco Use Prevention Education Program (TUPE), and the California Department of Public Health, California Tobacco Control Program (CTCP). The three-day conference, held October 27-29, 2015, in Sacramento, brought together 595 members of the tobacco control community; featured national experts in tobacco control education, science, policy, and prevention such as Susan Weiss, Ph.D., Director of Intramural Research at the National Institute on Drug Abuse, and Eliseo Perez-Stable, M.D., Director of the National Institute on Minority Health and Health Disparities; and provided the types of small-group breakout sessions that help build the interagency relationships and collaborative contacts needed to strengthen efforts to eliminate tobacco use in California.

Conference evaluations distributed on-site and collected at the conclusion of the conference were completed by 192 (32 percent) of the attendees. Nearly all of the respondents (90 percent) rated the conference program, the presenters' effectiveness, and the program guide as good or excellent; nearly all of the respondents (91 percent) reported that moving the tobacco control advocacy sessions, tobacco control and disease-related research, and youth tobacco prevention sessions to one conference was effective or very effective; and nearly three-fourths (74 percent) reported the conference increased or very much increased their contacts in their fields. Selected presentations from the conference speakers and the compendium of abstracts from the posters sessions were made available on the TRDRP website (www.trdrp.org/events/joining-forces-conference.html) for those who were unable to attend. The Joining Forces 2020 Conference: Ending the Tobacco Epidemic for All, scheduled for June 15-18, 2020, was postponed due to the COVID-19 pandemic.

Building capacity also includes creating a pipeline into the tobacco control field for young investigators. The TRDRP Cornelius Hopper Diversity Supplement is offered each year to undergraduate and Master's level graduate students who are from underrepresented communities or who are interested in pursuing research careers focused on underserved communities. These two-year supplements allow students to work under the mentorship of a currently funded TRDRP investigator and fund the awardee's salary, benefits, tuition, enrollment fees, and travel to TRDRP and scientific conferences. The TRDRP Student Research Supplement fosters undergraduate and master's student research in tobacco control or tobacco-related disease that focuses on one of TRDRP's eight research priorities. These supplements cover salary, benefits, tuition, and enrollment fees for the trainee and provide for travel to TRDRP and other scientific conferences.

TRDRP internships create opportunities for undergraduate students to work alongside TRDRP staff, learn about the breadth of tobacco control research, and gain insight into the grant funding process. Rakiah Anderson, M.P.H., was hired for a TRDRP internship in 2015 through the Health Careers Connection Program. When her internship ended, she received a Cornelius Hopper diversity supplement, which allowed her to gain research experience on a TRDRP-funded project. After receiving a Youth Activism fellowship from Truth Initiative, a nonprofit health organization focused on keeping youth and young adults tobacco-free, Rakiah became the Youth Liaison on their Board of Directors. In June

2020, she earned her Master of Public Health degree at the University of North Carolina, Chapel Hill, in the Department of Health Behavior, where she worked with two faculty members who have ongoing tobacco control research projects.

"Because of my TRDRP internship, so many doors opened," says Anderson, the first person in her family to graduate from college. "At TRDRP, I got an overview of the world of tobacco control research. I learned how [TRDRP] program officers work with researchers. I was able to meet and network with people in ways that allowed me to see that I could pursue a career in research and tobacco control. The position gave me opportunity after opportunity after opportunity. It also showed me that tobacco control is a social justice tool, because people of color are disproportionately affected by tobacco, and they often aren't able to advocate for themselves—and I want to make a difference in this area."

2.3.3 Eliminate Tobacco-Related Health Disparities

TEROC defines health equity as "the attainment of the highest level of health for all people." In the context of tobacco control research, achieving health equity in California will not be possible unless specific attention is focused on the communities that have higher rates of tobacco use than the general population, experience greater exposure to secondhand smoke at work and at home, are disproportionately targeted by the tobacco industry, and have higher rates of tobacco-related disease than the general population. TRDRP concentrates research funding on these priority populations.

In 2016, TRDRP began investing in a Community Practice-Based Research (CPBR) initiative to fund academic-community collaborative research projects aimed at identifying clinical, structural, and organizational factors that are barriers to successful implementation of smoking cessation programs in community health and behavioral health clinics serving Medi-Cal patients. The patients seen in these clinics often have multiple, complex health problems; they also have high rates of tobacco use. In addition, the doctors who work in these clinics typically have a very high patient load. As a result, quitting tobacco can be seen as the patient's least important healthcare problem to address in the limited time a doctor has to see a patient.

Joseph R. Guydish, Ph.D., M.P.H., at the University of California, San Francisco, in collaboration with HealthRight 360 and the San Francisco Health Network, were one of the first teams to be funded through this new initiative. This team is currently investigating strategies for treating tobacco use among high-risk, low-income smokers, such as tobacco-free grounds policies in residential addiction treatment programs. Dr. Guydish is also investigating whether implementing a patient tobacco registry in primary care clinics can increase patient access to tobacco cessation services for low-income residents. Researcher Elisa Tong, M.D., at the University of California, Davis, has received TRDRP funding to develop an electronic health records system that increases contact between the California Smokers Helpline and Medi-Cal patients who smoke and receive services in a Los Angeles County Department of Health Services primary care clinic. Her project also involves the implementation of a statewide system that supports pharmacist-delivered smoking cessation medications. In Los Angeles County, Theodore C. Friedman, Ph.D., M.D., and Brian Hurley, M.D., of the Friends Research Institute, are investigating the feasibility of embedding comprehensive smoking cessation programs into the county's outpatient primary care and mental health clinics.

2.3.4 Minimize the Health Impact of Tobacco Use on People and the Environment/Protect People and the Environment

Tobacco-related diseases kill about 40,000 Californians every year. Many people are aware that smoking puts people at high risk of developing lung cancer and heart disease. Far fewer understand the extent to which tobacco smoke harms people who never pick up a cigarette. Every year, more than 4,000 nonsmokers in California will die from cancer, heart, lung, and other diseases caused by exposure to secondhand smoke and thirdhand smoke. Secondhand smoke refers to both the smoke that goes directly from cigarettes into the air and the smoke exhaled by smokers. Thirdhand smoke

refers to the toxic chemicals and particles from cigarette smoke that linger indoors for months or years and are absorbed by, for example, carpets, walls, furniture, and children's toys.

TRDRP funds innovative and high-impact research that can guide and support public policy efforts to reduce secondhand and thirdhand smoke exposure by children and adults. TRDRP also encourages researchers to investigate the toxicological profiles and exposure risks posed by second and thirdhand emissions from new products such as e-cigarettes and heat-not-burn devices. Finally, with the passage of Proposition 64, TRDRP's research agenda broadened to include investigations into the impact and health risks of the co-use of cannabis and tobacco, including second- and thirdhand cannabis smoke. Research grants in this area include the following:

- Pilot Award to Tianying Wu, Ph.D., at the San Diego State University Research Foundation, to look at the effects of secondhand smoke exposure, past smoking, and diet on a woman's risk for breast cancer recurrence;
- Pilot Award to Rufus Edwards, Ph.D., at the University of California, Irvine, to validate a tool to measure secondhand emissions from e-cigarettes;
- Pilot Award to Stella Tommasi, Ph.D., at the University of Southern California, to determine whether secondhand smoke causes molecular, or epigenetic, changes that may lead to lung cancer; and
- Research Award to Georg Matt, Ph.D., at the San Diego Research Foundation, to investigate how residents of multiunit housing are affected by their neighbors' tobacco smoke, electronic cigarette vapor, or marijuana smoke.

Since 2011, TRDRP has supported the Thirdhand Smoke Research Consortium, described in detail later in this report. In 2018, TRDRP began funding the Consortium's Thirdhand Smoke Resource Center, a new website (www.thirdhandsmoke.org) dedicated to sharing information, resources, and technical support with California residents, communities, businesses, healthcare professionals, and policymakers on the dangers of exposure to persistent and toxic residue left behind by tobacco, e-cigarettes, and marijuana use in indoor environments.

TRDRP funding for Consortium research is increasing understanding about genetic susceptibility to thirdhand smoke; detection and remediation of thirdhand smoke; determination of human exposure levels to thirdhand smoke; reduction in exposure to thirdhand smoke in multiunit housing; and translation of findings from animal exposure studies to human health effects.

2.3.5 Protect Youth and Young Adults

Working in collaboration with the California Department of Public Health, California Department of Education, community tobacco control programs, schools, and youth-serving organizations throughout the state, TRDRP funds research into programs and policies that can help keep youth tobacco-free.

TRDRP funding made it possible for a research team led by Bonnie Halpern-Felsher, Ph.D., at Stanford University to develop the Tobacco Prevention Toolkit, a theory-based and evidence-informed educational resource that can be adapted to meet the needs of elementary, middle and high schools; community-based organizations; and health-related agencies throughout the state.

"TRDRP was there at the beginning, funding a two-year pilot study in 2009 that allowed us to form coalitions with schools and educators and run focus groups with students, parents, health educators, and administrators to determine what was needed," says Halpern-Felsher. "They supported us as we evaluated the project, and as we added materials to address new products, like e-cigarettes. We know this model works."

As of March 31, 2020, the five-session curriculum, which includes more than 100 lessons, activities, worksheets, PowerPoint presentations, quizzes, and other tools aimed at changing youth attitudes about tobacco use, increasing

their resistance skills, and decreasing their use of cigarettes and other tobacco products has reached more than 1.3 million youth across the U.S.

In 2019 alone, the Tobacco Prevention Toolkit team directly reached close to 500,000 youth with Toolkit trainings and outreach activities in 32 of 58 California counties (figure 9).

Figure 9: Map of California showing where the TRDRP-funded Tobacco Prevention Toolkit has been used (source, Bonnie Halpern-Felsher)

The California Department of Education administers the California Tobacco-Use Prevention (TUPE) program for students in grades 6 through 12. Schools receive TUPE funding through a competitive grant process. A school with a fully implemented TUPE program establishes and enforces tobacco-free campus policies, participates in the California Healthy Kids Survey, and provides evidence-based tobacco-use prevention and cessation education. A TRDRP-funded study by researchers from the University of California, San Diego, published in PLoS One, in 2018, evaluated the TUPE program.

For the study, the researchers used data collected from the California Educator Tobacco Survey and the California Student Tobacco Survey to compare responses from teachers and students at schools that had TUPE funding to teachers and students at schools that did not. The research team also visited 18 schools to track anti-tobacco signage frequency, smoking paraphernalia (cigarette butts and cigarillos wrappers, for example) seen on the school campus and in parking lots, visible student use of tobacco, the smell of tobacco or marijuana, and proximity of smoke and cigarette shops to the campus. Overall, the study found that TUPE-funded schools were more likely to provide tobacco-specific health education programs, place a priority on tobacco-prevention efforts, and better prepare educators to address tobacco use than were schools that were not TUPE funded. Importantly, students at the TUPE-funded schools also had lower rates of tobacco use.

2.3.6 Help Californians Quit Tobacco Product Use

TRDRP-funded research, led by investigators at the University of California, San Diego, School of Medicine and published in 2018 in *Cancer Prevention Research*, found that California's early adoption of evidence-based tobacco control programs kept people from starting to smoke, reduced the amount of tobacco used by smokers, and helped smokers quit at a younger age. This success can be measured by lives saved; because of these programs, lung cancer deaths are 28 percent lower in California than in the rest of the United States.

Using TRDRP-funded research, the California Tobacco Control Program developed the ad campaign Flavors Hook Kids (www.flavorshookkids.org), which makes clear "The Tobacco Industry Has a Kids Menu." The website explains why the tobacco industry specifically uses fun flavors and tech devices to hook kids on nicotine (a kid's brain is easier to addict); provides statistics on the rapid increase of vaping among youth; provides a toolkit for parents to talk to kids about vaping; and provides information on opportunities to get involved in local and statewide efforts to combat youth vaping.

TRDRP also funded research to model the impact a $2.00 tobacco tax increase would have on the state's economy. This research, led by James M. Lightwood, Ph.D., at the University of California, San Francisco, estimated the expected response of smokers' cigarette consumption following implementation of the tax and the impact a reduction in smoking resulting from the tax would have on per capita health care expenditures, the California cigarette market, employment, and gross domestic product (GDP). This research showed that the tax would reduce smoking prevalence in California by two percentage points below what it would have been by 2020 if the tax had not been implemented. The modeling predictions also showed that the tax increase would reduce the tobacco industry's revenue by $250 million per year, would create 6,000 new jobs in California, and increase the state GDP by $700 million per year.

Increasing the number and frequency of quit attempts has been shown to be the most effective strategy to help people permanently quit smoking. Since 2018, the Affordable Care Act has required smokers have access to free, comprehensive smoking cessation treatments. TRDRP has consistently funded research aimed at learning the best way to provide culturally- and linguistically-appropriate evidence-based smoking cessation programs to specific populations and how these specific populations benefit from FDA-approved pharmacotherapies; behavioral support classes, counseling, and online programs; and performance incentives.

The grants that comprise the TRDRP Social and Behavioral Prevention and Treatment portfolio fund research designed to optimize tobacco-use prevention and cessation interventions directed at California priority populations. Research grants in this area include the following:

- Research Award to Roland Moore, Ph.D., of the Pacific Institute for Research and Evaluation, to design a multi-level program to prevent commercial tobacco-related harms on rural California Tribal land;
- Pilot Award to Kelly Courtney, Ph.D., at the University of California, San Diego, on the use of virtual reality to induce and assess nicotine craving;
- Research Award to Laura D'Anna, Dr.PH., at the California State University Long Beach Foundation, to develop a tobacco and cannabis intervention for young black men who have sex with men;
- Pilot Award to Claradina Soto, M.P.H., at the University of Southern California, to curb the high rates of tobacco use among American Indian youth with youth-driven media campaigns using PSAs, photovoice, and digital storytelling; and
- Research Award to Burton Cowgill, Ph.D., at the University of California, Los Angeles, to develop an afterschool tobacco use prevention program for middle school students.

2.3.7 Counter the Tobacco Industry

The tobacco industry has consistently tried to derail California's efforts to curb tobacco use. On the advertising front, the tobacco industry's expenditures in California vastly outpace the state's tobacco control efforts. For example, in 2014 the tobacco industry outspent the state's tobacco control efforts by 19 to 1 on a per capita basis.

To counteract the tobacco industry, TRDRP funds state and local tobacco control policy research that can help state agencies, the legislature, and local governments evaluate and implement science-informed tobacco control policies. To advance these efforts, TRDRP added a new two-year Rapid Response Research to Accelerate Policy award in 2019 to

support researchers working in partnership with advocates, community members, policymakers, and other decision makers identify and study emerging local tobacco policy issues. The inaugural recipient of this award, Sabrina Smiley, Ph.D., M.P.H., MCHES, of University of Southern California, will study how regulation of menthol cigarettes – products that tobacco companies market to Black communities, perpetuating tobacco-related health disparities – affects retailers and smokers. Policy research has advanced the field's understanding of the impact of price on the demand for marijuana and cigarettes, the impact of cartoon-based marketing strategies on the appeal of e-cigarettes to adolescents, community college smoke-free policies, the economic impact of the California Tobacco 21 Law, and more.

In 2017, TRDRP created the Tobacco Policy Research Centers award, a four-year grant that supported multi-disciplinary teams of researchers working in partnership with advocates, community members, policymakers, and other key stakeholders to identify, respond to, and disseminate policy research that directly address local tobacco policy issues and their potential to influence state and national policy, and vice versa. The first recipient of this award was the University of California, Merced, which received a $3.8 million grant in 2018 to establish the UC Nicotine and Cannabis Policy Center (ncpc.ucmerced.edu). The new center, led by health psychology professor Anna Song, Ph.D., expands policy research in California from the large cities along the coast to underserved inland areas in the San Joaquin Valley and Sierra Foothills. In this often-overlooked region of California, tobacco and drug use rates and illnesses are significantly higher than in other areas of the state.

Through its research activities, community engagement plans and training opportunities, the new Center will elevate the voices of rural Californians on tobacco and cannabis policies. It will also help shape tobacco control efforts in the region by establishing grassroots support for tobacco and cannabis control policy; monitoring tobacco and cannabis control policy efforts; supporting short- and long-term research projects that can inform local and state policies; and establishing a visible and stable presence for tobacco control research in the Valley. The center will also focus on ways to empower and support youth in the San Joaquin Valley and Sierra Foothills to become agents of change in tobacco/cannabis control policy efforts at the local and state level.

"We were in dire need in the San Joaquin Valley and Sierra Foothills for good data on what is happening in this region, and the psychological variables and risk factors that lead youth to begin smoking," said Song. "The funding TRDRP has provided will be transformational. We are on our way to becoming a unifying voice for the organizations working in the 11 counties in this region to implement tobacco control programs and policies that will be effective for our residents."

3 TRDRP Grantmaking Practices: Strategic, Rigorous, and Agile

3.1 Strategic Planning in a Changing Landscape

3.1.1 2015-2020 Strategic Plan

In 2014, TRDRP initiated a strategic planning process to reevaluate and update the program's funding priorities and mechanisms in ways that would position the program to respond to new challenges and evolving biomedical and scientific advances. This included evaluations of policy gaps and the impact of new tobacco products, such as e-cigarettes, within the context of declining Proposition 99 revenues.

Input and data were obtained from TRDRP stakeholders, funded grantees and the TRDRP Scientific Advisory Committee (SAC). Throughout this process, TRDRP remained in regular communication with members of the Tobacco Education and Research Oversight Committee (TEROC), ensuring that this plan reflected their input and perspectives.

The data indicated that TRDRP plays an important role as one of the few funding organizations with the flexibility to fund new and novel — and thus riskier — research that can later be leveraged into full-scale projects funded by larger entities. In response, TRDRP's exploratory and pilot grant mechanisms were revised to focus on funding innovative "high

risk, high reward" research. The data also indicated that information was sorely needed on new and emerging tobacco products, such as e-cigarettes and heated tobacco devices, and their impact on health. To address this need, the Strategic Research Initiatives that TRDRP uses to target critical topics in tobacco control and tobacco-related diseases are now used to fund research into emerging new tobacco products and the effects on the body of nicotine delivered without combustion. Career development in tobacco-related research remained a top research priority.

In summary, the TRDRP Scientific Advisory Committee (SAC) affirmed the following guiding principles for TRDRP grantmaking activities over the next five years:

1. Fund innovative exploratory and pilot studies in tobacco-related research.
2. Fund training and career development in tobacco-related research.
3. Fund strategic research initiatives to address emerging and critical tobacco/nicotine-related issues and science.
4. Strengthen participatory research and community engagement strategies.

3.1.2 Revisions to the 2015-2020 Strategic Plan after the Passage of Proposition 56

The Proposition 56 voter initiative to increase state tobacco taxes established "The California Healthcare, Research, and Prevention Tobacco Tax Act of 2016," the first state tax increase on tobacco products in 28 years. In addition to increasing the tax on a pack of cigarettes by $2, the law levied a new tax on electronic cigarettes. This initiative to save lives through healthcare services and reduce the disease and fiscal burdens of smoking and tobacco-use in California was put forward by a broad coalition of citizen and health organizations.

As a result of the initiative, since July 2017 a significant amount of new funds has gone toward addressing an array of critical healthcare, research, and public health needs throughout the state. Five percent of this new revenue supported tobacco-related research administered through TRDRP.

The added Proposition 56 revenue significantly expanded TRDRP's ability to advance health-related research and to inform California's tobacco control efforts. TRDRP research priorities have always had a broad yet strategic focus on the effects of smoking and tobacco use on human health and behavior that were aligned with the goals of Proposition 56. The new funds allowed TRDRP to increase its grant funding approaches and priorities to fund, as stated in Proposition 56, "basic, applied and translational medical research into the prevention, early detection of, treatments for, complementary treatments for, and potential cures for all types of cancer, cardiovascular and lung disease, oral disease and tobacco-related diseases." TRDRP also continued to maintain its longstanding commitment to direct a substantial portion of funds for research on health disparities related to tobacco use and the tobacco-related diseases that disproportionately affect specific populations in California.

3.1.2.1 *Expansion of Research Priorities*

Cross-cutting emphasis on research to reduce health disparities.

TRDRP-funded research has contributed to the steady decline in California smoking rates over the past three decades. Cigarette smoking and use of other tobacco products, however, remain disproportionately high in many California communities, contributing directly to higher than average rates of cardiovascular disease, lung and oral disease, cancer and other tobacco-related diseases. Community education and prevention efforts and state policies currently do not adequately protect these communities from being targets of the tobacco industry, resulting in health disparities that further damage these communities and increase health care costs. In an effort to utilize multiple avenues to eliminate tobacco-related health disparities, all TRDRP research priorities were revised to encourage studies designed to directly address disparities in tobacco use and the diseases that result.

Expanded cancer research priority.

Prior to the passage of Proposition 56, TRDRP accepted proposals only for cancer research projects that focused on early detection of the disease. In accordance with the broadened scope of biomedical research mandated by Proposition 56, TRDRP expanded its cancer research priority to include cancer prevention, cancer health disparities, translational research, and basic science.

New research emphases in lung, cerebrovascular and oral disease.

Cancer and heart disease are the most widely recognized tobacco-related diseases. But tobacco use is also linked strongly to chronic obstructive pulmonary disease (COPD), stroke, and poor dental health. TRDRP has expanded research priorities in these areas to encourage more research into these diseases, their relationship to tobacco use, and their connection to other tobacco-related diseases.

Cannabis use and tobacco-related diseases.

In 1996, Californians legalized medical marijuana (cannabis); 20 years later cannabis was legalized for recreational use with the passage of Proposition 64. Yet, very little is known about the impact of cannabis use, and there is a glaring lack of rigorous peer-reviewed studies on the potential benefits and harms of cannabis. This makes it extremely difficult for lawmakers to create informed, meaningful policies regarding cannabis availability and use. As a result, TRDRP began calling for proposals from researchers to study the relationship between cannabis use and tobacco-related diseases. To avoid conflicts with federal and state regulations, investigators were strongly encouraged to refer to their institutional policy on conducting cannabis research before designing their studies.

Expanded List of Research Priorities Resulting from Proposition 56 and 2015-2020 Strategic Plan

- Tobacco-related health disparities
- Cancer prevention, treatment, and biology
- Cardiovascular and cerebrovascular diseases
- Cannabis use and tobacco-related diseases
- Environmental exposure and toxicology
- Neuroscience of nicotine addiction and treatment
- Oral diseases and dental health
- Pulmonary biology and lung diseases
- State and local tobacco control policy research

3.1.2.2 *Changes to Awards and Process*

New award types to expand the research pipeline.

Training individuals to perform robust research is key in the battle against tobacco use and the environmental and medical harms they cause Californians. TRDRP implemented new research supplemental and training awards to fill previous gaps in its portfolio and provide funding to train individuals at all stages of the educational pipeline, from high school students to independent investigators.

Expand funding levels and duration of research award types.

Due to the decline in tobacco tax revenue, the total amount and duration of TRDRP awards declined steadily prior to 2017. With passage of Proposition 56, TRDRP was able to increase award levels and duration of funding for all research award types.

Additional funding cycles.

Prior to 2017, TRDRP held one funding cycle per year. To facilitate the anticipated increase in the volume of applications, TRDRP instituted additional funding cycles between 2017 and 2019, resulting in four funding cycles total during that period. In 2020, TRDRP returned to a single funding cycle and offered two additional grant types, as described below

3.2 Grant Making Tools to Address a Changing Tobacco Landscape

3.2.1 A RIGOROUS, SCIENTIFICALLY INFORMED AWARD SELECTION PROCESS

The foundation of TRDRP's award selection process is peer-review, modeled after the National Institutes of Health (NIH). This is the gold standard for rigorous review of research proposals and publications. The TRDRP Scientific Advisory Committee (SAC) further supports award selection by ensuring that awards proposed for funding are programmatically

aligned and represent a balance across the TRDRP funding portfolio, while remaining within the budgetary constraints of the program. The TRDRP Director and the Research Grants Program Office Executive Director provide a final control to ensure that awards are processed in a fiscally responsible manner.

Figure 10: TRDRP relies on scientific experts from outside of California to evaluate applications and its Scientific Advisory Committee to ensure grants align with TRDRP mission, priorities, and budget.

3.2.2 A Focus on Community Engagement

Over the past five years, TRDRP has remained committed to ongoing efforts to disseminate findings from the grants to the communities throughout California that can benefit from this research. TRDRP has also continually created new opportunities to involve community-based organizations and community-level health clinics in the research process.

Toward that end, in the 26th grant cycle, funded in 2017, TRDRP began to require that all applicants include a Community Engagement Plan in their grant proposal submission. Developing these plans requires investigators to think creatively and thoughtfully about how to include community members in their research process and/or find ways to incorporate tobacco-related issues contributing to health disparities in their proposal. Incorporating community engagement at the outset lays the groundwork for broader engagement in the findings and, in turn, a greater likelihood that the research will lead to a reduction in health disparities.

Community members or community organizations can be involved at all stages of research, from development and implementation to dissemination. Grantees are also encouraged to consider the ways in which their findings could impact residents from the communities engaged in their research. Community engagement can take many forms. Grantees studying smoking prevention and cessation could potentially engage with patients in priority populations as part of their research. Biomedical researchers could potentially present their findings to the public in ways that help communities understand how their work contributes to the research-informed policy changes that will lead to a reduction in tobacco use. In efforts to find unique and creative ways to disseminate the goals and findings of their research to local communities, TRDRP researchers have formed relationships with museums, published medical comics in national research journals, and provided information to national news outlets.

3.2.3 Community-Based Participatory Research Funding at TRDRP

For 20 years, TRDRP funded community-based participatory research (CBPR) through its Community and Academic Research Award (CARA) and School Academic Research Award (SARA) grant mechanisms. These awards required close collaborative partnerships between members of community-based organizations (CBOs), community members, school

educators, and academic researchers or community-oriented research scientists. These awards successfully identified ways to improve tobacco control prevention and treatment interventions throughout the state. However, the structure of these grants did not provide needed opportunities to expand on pilot project successes. A comprehensive assessment of CARA/SARA awards made between 1999 and 2007 indicated that, for the most part, these awards had limited success in achieving desired outcomes. The assessment showed:

- Fewer journal articles, book chapters, and conference presentations resulted from these awards than other types of research awards;
- Results were not always communicated back to the target community or the group studied;
- It was unclear if the projects expanded community capacity for research or led to funding from other sources; and
- The duration and quality of community partnerships was unknown.

In 2016, TRDRP engaged stakeholders in an effort to re-imagine community-based grants that would emphasize longer-term thinking and support plans to sustain research partnerships that would make it possible to translate pilot-phase research into new interventions in targeted high-priority communities or enhance existing evidence-informed interventions. A new two-year award, the Community-Partnered Participatory Research Award (CPPRA), was established. CPPRA supports pilot projects that will affect community, clinic, or school-level tobacco use and inform evidence-based prevention and treatment programs and interventions or contribute to practice/policy changes in California clinics, schools, institutions, and/or communities through the establishment of equitable and sustainable partnerships between the researchers and the community members.

In the 2019 pilot grant cycle for the new CPPRA, TRDRP emphasized to researchers that their aims should reflect and embody the importance of community benefit in tobacco control research, cultural humility, and mutual (community and academic) capacity building for a sustained equitable partnership beyond the life of the grant. Notably, the CPPRA grant mechanism requires that a Community Co-Principal Investigator (Co-PI) and Academic Co-PI, with guidance from a Community Advisory Board (CAB), establish a collaborative, equitable research partnership to gather preliminary data or demonstrate proof-of-concept for their tobacco-related research question, illustrate its importance to their community, and explain how it advances science or informs policy. In addition, reflecting the spirit and goals of CBPR, the Community and Academic Co-PIs have equal decision-making authority on the collaborative research project and each manages their own budget. Moving forward, TRDRP will continue to refine the CPPRA grant mechanism to ensure that it funds research projects that have the greatest likelihood of empowering communities. This will in turn lead to community engagement in developing the policies, practices, and prevention tools that will protect the health of those they love from tobacco use and tobacco-related diseases.

To build capacity and interest in authentic community-academic partnerships and expand the number of applicants seeking funding through the CPPRA grant mechanism, TRDRP partnered with the California Breast Cancer Research Program (CBCRP) in 2019 to adapt their technical assistance program, called QuickStart, for tobacco-related research projects. The QuickStart technical assistance program includes outreach to community and academic partners; training on how to use the principles of CBPR in tobacco control research; tips and feedback on how to include CBPR principles in an effective grant application; and technical assistance to produce a concept paper describing the proposed research partnership. In addition, all QuickStart participants are invited to a mock peer review meeting that familiarizes them with and prepares them for the peer review process of their grant proposal.

The 2019-2020 cohort included three Tobacco Research Teams and six Breast Cancer Research Teams. Two of the three Tobacco Research Teams submitted proposals for the CPPRA awards that year and scored well but ultimately were not selected for funding. The formation of new collaborations between groups that had not previously competed for partnered-CBPR awards is an opportunity to build further trust, and bodes well for future success in competing for grants. TRDRP intends to work with CBCRP to revise the QuickStart tobacco control curriculum to improve the quality of

applications for peer review, with the goal of helping communities contribute to the development of interventions and evidence-informed policy decisions that directly affect them.

3.2.4 Investigator Initiated Awards

To leverage the vast research infrastructure and intellectual capital in California's research institutions, TRDRP invites all eligible investigators to propose projects that align with TRDRP's research priorities. These proposals are then assessed in a peer-review process. By inviting proposals from both seasoned tobacco investigators and investigators new to the field of tobacco-related research, TRDRP attracts the best minds to study tobacco control and tobacco-related disease.

3.2.4.1 *Brief overview of award mechanisms*

TRDRP's award mechanisms for investigator-initiated projects are designed to support early stage researchers as they establish their careers (Predoctoral, Postdoctoral and New Investigator Awards), allow established investigators to explore risky but potentially high impact ideas (Pilot Awards), and extend findings through more mature studies with clear potential for policy, clinical, translational, or other scientific impact (Research Awards).

Research Awards

Research Awards are TRDRP's most substantial individual investigator awards, supporting research on well-developed concepts. These awards cover research costs of up to $250,000 per year for up to three years.

Pilot Awards

Pilot Awards support exploratory research to obtain initial evidence for a new paradigm or research hypothesis, with the ultimate goal of pursuing promising findings with funding for larger research awards from TRDRP or other funding agencies. These awards cover research costs of up to $200,000 per year for up to two years.

New Investigator Awards

New Investigator Awards (TRDRP Scholar of Targeted Advanced Research on Tobacco (START) Awards and New Investigator Award) are designed to support the careers of promising researchers who started their independent research program within the last five years. These awards cover research costs of up to $200,000 per year for up to three years.

Postdoctoral and Predoctoral Awards

Postdoctoral and Predoctoral Awards support the mentored training of future independent investigators, maintaining a robust pipeline of promising tobacco investigators. These awards mainly cover stipends and some tuition and fees for trainees.

3.2.4.2 *Limiting Eligibility for Research Awards*

TRDRP-funded research addresses a wide range of tobacco-relevant questions in social, behavioral, policy and biomedical sciences. In an effort to more closely align TRDRP's most substantial awards with the most urgent questions in tobacco control, proposals for Research Awards must focus on one or both of TRDRP's emphasized areas of interest: tobacco-related health disparities, and new and emerging tobacco products.

Health disparities

While remarkable progress has been made in reducing smoking rates in California over the past few decades, racism and other forms of discrimination along with targeted advertising by the tobacco industry have created significant disparities in tobacco use. To broaden the evidence base that is needed to overcome entrenched and emerging tobacco-related problems in these communities, all Research Awards in this category must address these health disparities.

New and emerging tobacco products

The tobacco industry must continually innovate to addict new customers. Recently, the industry began to introduce numerous new products, such as electronic (e-) cigarettes and heated tobacco products such as IQOS. These new products, which are designed to attract youth and young adults, have jeopardized gains that have

been made in reducing tobacco use in California. Studies that can identify the best approaches to keep youth from using these new products and to help addicted youth quit are critical. Research into the specific ways these products affect people's health — which are likely to differ from the health effects of combustible cigarettes — and whether it is beneficial or harmful for smokers to switch to these new products is also essential. Requiring Research Awards that do not address health disparities to focus on these new and emerging tobacco products ensures California keeps up with the tobacco industry's relentless efforts to broaden its consumer base.

3.2.4.3 *Supporting early career researchers*

TRDRP believes it is critical to fund early-career researchers who will conduct studies that can inform tobacco control and prevention-related clinical recommendations, local policies, and federal regulations. To help young researchers establish their place in this field, TRDRP has historically funded graduate students, postdoctoral scholars, and early-stage independent investigators. Decreasing Proposition 99 funds impacted TRDRP's ability to award grants specifically for these early-career investigators. However, with the passage of Proposition 56, TRDRP was able to re-establish its Predoctoral Awards for graduate students and its New Investigator Awards to rebuild a pipeline critical for bringing young researchers into the tobacco field.

3.2.5 Strategic Research Initiatives:

Tobacco and Cannabis Impacts on the Environment

In 2017, TRDRP established a partnership with the UC Natural Reserve System (NRS), which supports university-level teaching, research, and public service at protected wildland sites throughout California. The TRDRP Scientific Advisory Committee approved two TRDRP-NRS funding collaborations: the Mildred E. Mathias Graduate Research Grant, which provides $15,000 for up to five tobacco-related graduate student projects, and the NRS planning process grant for a research initiative that will evaluate the environmental impact of tobacco and marijuana use in California.

Community Practice Awards

In 2016, TRDRP began investing in the Community Practice-Based Research (CPBR) initiative. This program funds collaborative health service research projects aimed at identifying clinical, structural, and organizational factors that contribute to or create barriers to the delivery of evidence-based tobacco cessation treatments for lower-income people enrolled in Medi-Cal. This initiative requires a strong partnership between a lead health service researcher and a clinical director or equivalent who are dedicated to systems-change, understand and respect the principles of community-based participatory research. It targets this patient population because they smoke tobacco at disproportionately higher rates than higher income Californians, are often not offered tobacco cessation services in clinical settings, and have a higher prevalence of exposure to health care-related discrimination. This population also typically receives care within healthcare systems that manage a high patient volume and operate with more limited funding streams. TRDRP's first CPBR grants were made in 2018, and early indicators along with community feedback suggest these investments have already begun enhancing community-level cessation activities within a framework dedicated to sustainable systems change. TRDRP provided funding for both Pilot and Implementation phases of CPBR projects.

Thirdhand Smoke Research Consortium

In 2011, TRDRP became the first funding agency in the world to initiate research on thirdhand smoke (THS) as a new frontier in tobacco-related science, with the funding of a multi-investigator, multi-disciplinary Thirdhand Smoke Research Consortium; TRDRP renewed the funding in 2014. The renewal consortium included nine research projects across five institutions (UCSF, Berkeley National Lab, UC Riverside, San Diego State University, and USC). The specific aims and some key results of the renewal grant were as follows:

- **Chemically characterize THS in order to identify potentially hazardous or toxic constituents that may be present.** These studies revealed that previously-identified and novel toxicants are found in homes and businesses where people smoke and can persist for at least one year after an environment becomes smoke-free.

This research also showed that remediation of THS is not possible using ozonation, a method that was hypothesized to remove these toxicants. In fact, ozonation of aged THS was instead found to produce high concentrations of oxidized species and to generate new ultrafine particles.

- **Characterize relevant and specific biomarkers that could serve as diagnostic indicators of exposure and quantify human exposure to THS.** Nicotelline is a minor tobacco alkaloid identified in smokers' house dust and in ambient air samples; it is a promising novel marker of environmental THS contamination. Researchers found that contact with THS-contaminated clothing resulted in substantial exposure to nicotine and tobacco-specific nitrosamines throughout the body. This study also found that the hands of patrons of a smoke-free casino that had previously allowed smoking were contaminated with nicotine.
- **Provide scientific evidence either for or against clear and significant health risks to humans as a result of exposure to THS.** Consortium researchers identified mechanisms by which THS can cause DNA damage, cell death, and disruption of normal metabolism, increasing risk for cancer and brain and metabolic disorders. Animal studies showed adverse biological effects occurred at THS levels comparable to the concentrations at which people are typically exposed. Animal studies also found a greater susceptibility and effects that are more prolonged when exposure to THS occurs early in life.
- **Design an evidence-based approach to THS exposure risk policies, policy implications and issues.** A systematic review of the literature on THS was conducted. This was followed by a workshop for consortium investigators, public health representatives, and individuals from the real estate industry who reviewed the research findings and discussed policy recommendations.
- **Disseminate any evidence related to the health risks of THS to the California tobacco control stakeholders as well as the general public, including any recommendations on potential approaches to eliminate risk.** To develop a dissemination plan, the THS Consortium expanded its external advisory board to include members from the CDC, EPA, California Air Resources Board (Cal EPA), Roswell Park Cancer Center, and TRDRP. The Consortium also used data from its past and current studies to develop a document with answers to frequently asked questions on THS. The data used were collected in various settings, such as multi-unit housing, single-unit homes, used cars, hotels, rental cars, and casinos, providing important reference points for educational efforts aimed at protecting nonsmokers and developing new policies that will provide better and broader protections for nonsmokers.

After a thorough peer review of the Consortium's impact, the TRDRP Scientific Advisory Committee (SAC) approved a third round of funding. The SAC required that this third phase incorporate a translational approach that would emphasize research aimed at translating findings to action-oriented results, including the following:

- Extending animal studies to human health effects;
- Exploring genetic susceptibility to thirdhand smoke;
- Developing ways to assess, detect, and remediate thirdhand smoke;
- Designing methods for determining human exposure levels to thirdhand smoke;
- Testing approaches to reduce exposure to thirdhand smoke in multiunit housing; and
- Developing effective strategies for educating communities about THS.

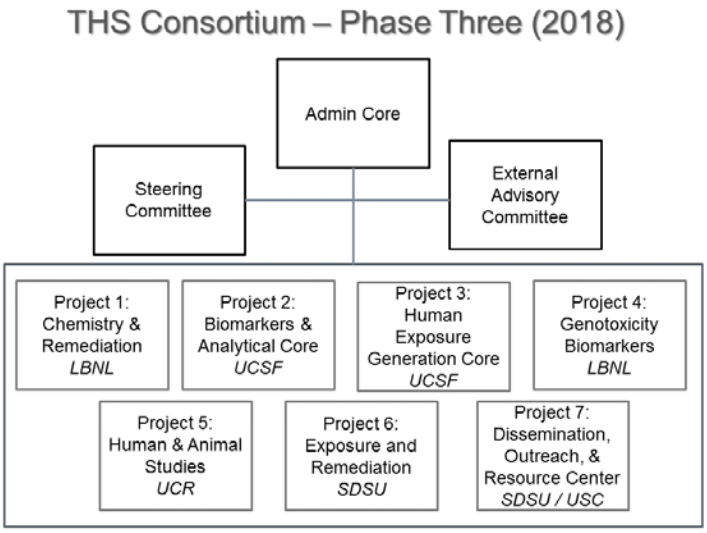

Figure 11: Organizational Structure of the third phase of the Thirdhand Smoke Consortium

The Consortium's Thirdhand Smoke Resource Center (Project 7 in figure 11) has been one of the major accomplishments of this third phase. The Center's new website (www.thirdhandsmoke.org) is dedicated to sharing information, resources, and technical support with California residents, communities, businesses, healthcare professionals, and policymakers on the dangers of exposure to persistent and toxic residue left behind by tobacco, e-cigarettes, and marijuana use in indoor environments.

THS researchers are also responding to the current COVID-19 health crisis. For example, the THS Consortium's Letter to the Editor: "An Imperative Need for Research on the Role of Environmental Factors in Transmission of Novel Coronavirus (COVID-19) — Secondhand and Thirdhand Smoke As Potential Sources of COVID-19" published April 24, 2020, in the Journal of Environmental Science and Technology, explained that indoor vaping/smoking must be avoided to prevent potential viral spread of the novel coronavirus via exhaled mainstream smoke to others smokers and to protect nonsmokers from exposure to viral particle-infected second/third hand aerosol and smoke. The letter also underscored the critical urgency of research on how the novel coronavirus might spread through indoor use of e-cigarette and combustible tobacco.

Policy Research for a Rapid Response

TRDRP research priorities include funding for state and local tobacco control policy research that can address the rapidly changing landscape of newly introduced products that target vulnerable populations. In 2019, this funding led to the establishment of the UC Merced Nicotine and Cannabis Policy Center. The new Center is developing community-academic partnerships that can find ways to reduce tobacco-related health disparities and decrease or prevent use of new and emerging tobacco products — including cannabis, as it relates to tobacco or tobacco-related disease — in the San Joaquin Valley. This region of California contains many ethnically diverse and underserved populations that have high rates of tobacco-related diseases and other illnesses. To reduce this morbidity and mortality, a key aim of the Center is to gain insight into the region's youth culture and tobacco use and identify ways to have that culture encompass youth as agents of change in tobacco/cannabis control policy efforts.

In 2020, TRDRP established the Rapid Response Research to Accelerate Policy initiative. This new program supports teams of researchers who are working in partnership with advocates, community members, policymakers and other decision makers to identify and conduct research on emerging local tobacco policy issues and disseminate the research findings. These projects will address causal relationships among new or existing policies and focus on informing policies that reduce tobacco-related health disparities.

Mackay California-Pacific Rim Tobacco Policy Scholar Award

The Mackay California-Pacific Rim Tobacco Policy Scholar Awards foster scientifically informed, evidence-based tobacco control policy and practice in California and the Pacific Rim region (Asia, Pacific Islands and Latin America) by building leadership and cross-regional partnerships among mid-career researchers. These TRDRP awards bear the name of the medical doctor Judith Mackay, in acknowledgement of her leadership and success in advancing tobacco control policies throughout the Asia-Pacific Rim. They focus on this area in recognition of the increasingly global nature of these policy challenges.

The first Mackay award was awarded to Stella Bialous, R.N., Dr.PH, in 2016 to investigate a new multilateral trade agreement, the Pacific Alliance, and its impact on tobacco control. Given the international reach of the tobacco industry, understanding how trade of new and emerging tobacco products occurs in the Pacific Rim is critical to Californians' health. Through the award, Dr. Bialous expanded her professional contacts within Pacific Rim countries and the WHO International Framework Convention, positioning her to become a leading expert on international trade of tobacco products.

The second award was awarded in 2019 to Jeremiah Mock, M.Sc., Ph.D., whose research focuses on understanding the cultural norms of tobacco use in outdoor settings. Smoking in the outdoors is hazardous because it produces secondhand smoke and tobacco product waste; it is also a fire hazard. Dr. Mock's research informed both SB8 and AB1718, legislation that led to laws banning smoking in California state parks and beaches. Dr. Mock continues to work with the California Tobacco Control Program to find creative ways to denormalize tobacco use and littering of tobacco product waste in public places. Although his practical research into tobacco control policies in Japan and Thailand is currently limited by the COVID-19 pandemic, his findings have been impactful at state and local levels.

COVID-19 Emergency Seed Funding

In March 2020, TRDRP partnered with other programs in the Research Grants Program Office (RGPO) of the University of California Office of the President on a research initiative in response to the emergence and spread of the severe acute respiratory syndrome coronavirus (SARS-CoV-2) and its associated disease (COVID-19) in California. By May, RGPO had reviewed and awarded 85 seed awards, 30 of which were funded by TRDRP ($2million RGPO-wide; $815,805 TRDRP). Each award received up to $25,000 for projects of six month duration. These COVID-19 Seed Awards support research on individuals and vulnerable populations at high risk of coronavirus infection and on biomedical approaches to address COVID-19 disease (uckeepresearching.org/rgpo/). A full list of projects funded by TRDRP can be found in Table 13.

In June, TRDRP in partnership with other programs in RGPO invited the 85 recipients of the COVID-19 Seed Awards to apply for continuation funding of up to $150,000 direct costs for one year. This COVID-19 Continuation Initiative was a limited competition request for proposals that aimed to achieve uninterrupted funding for one year for the most promising COVID-19 Seed Award projects. In October, 12 of the original 85 projects were awarded continuation funding to further the work, providing an additional $2.5 million ($1.16 million from TRDRP) to address the pandemic. A full list of the projects funded by TRDRP can be found in Table 14.

3.2.6 California Cancer Research Tax Check Off Fund

California State Tax Checkoff funds are voluntary donations designated by taxpayers on their state income tax forms. On behalf of the University of California, TRDRP administered the California Cancer Research Fund through 2016. Since 2017, these funds have been managed by another unit within the Research Grants Program Office. Through the tax checkoff fund, TRDRP received a total of $979,494 from July 1, 2015, through June 30, 2016. The proposals submitted underwent the same rigorous scientific review as other TRDRP awards.

The projects supported by California Cancer Research Tax Checkoff Funds were:

- "Genomic approaches to identify small cell lung cancer biomarkers," from principle investigator Dian Yang of Stanford University (2015)

- "Lung Cancer Screening: The Views of Patients and Physicians" from principle investigator Celia Kaplan of University of California, San Francisco (2015)
- "Investigating the carcinogenicity of e-cigarettes" from Principle Investigator Stella Tommasi of University of Southern California (2016)

3.3 TRDRP Research Priorities

Research in a landscape of changing tobacco product use

The injection of $200 million in new funding for research brought by Proposition 56 has allowed TRDRP to reinforce its already strong research in tobacco use cessation and prevention while expanding research even further into some tobacco-related diseases that were not previously included in its portfolio. Since 2017, TRDRP has called for and funded research in the expanded areas of cardiovascular, cerebrovascular (such as stroke), and lung diseases (such as EVALI).

Overarching research interests

TRDRP has prioritized research into ending tobacco-related health disparities, assessing the health impacts of new and emerging tobacco products, and identifying health and behavioral effects of added flavors and nicotine.

New and emerging tobacco products have grown remarkably in popularity, especially among populations disproportionately affected by tobacco product use and adolescents. Yet the effects of the flavoring additives used in these products remain unknown. TRDRP has funded researchers who are filling the gaps by analyzing the toxicology and health effects of these products and their flavorings. TRDRP continues to fund studies on the effects of nicotine itself, in both animal models and human subjects.

The co-use of cannabis and tobacco and its impact on health also remains unknown. Research on the biological and population level impact of combined use of these products is needed to inform effective health policies. For this reason, TRDRP funds research that includes cannabis as it relates to tobacco use, tobacco policy, or tobacco-related disease. Already, TRDRP-funded neuroscientists have expanded their research into nicotine addiction to include the effects of co-use on the developing adolescent brain. Similarly, research into the effects of secondhand cannabis smoke on the cardiovascular system is underway by TRDRP-funded researcher Matthew Springer, Ph.D, at the University of California, San Francisco, who has studied the health effects of secondhand cigarette smoke. A recent publication from policy researcher Lynn Silver, M.D, M.P.H., at the Public Health Institute, revealed that most California jurisdictions have failed to incorporate lessons learned from tobacco product regulation in the cannabis regulations they implemented following the passage of Proposition 64.

Overview of individual TRDRP Research Priorities

3.3.1 Social and behavioral research into tobacco use prevention and treatment

Tobacco use continues to cause disproportionately high rates of morbidity and mortality from cancer, cardiovascular disease, lung disease, and oral disease, in populations defined by gender, sexual orientation, race and ethnicity, age, educational attainment, income, health insurance, housing type and community, resulting in reduced quality of life. Tobacco-related health disparities devastate individuals, families, communities, and the economy. TRDRP supports research in this area that aims to:

- Optimize tobacco use prevention and treatment interventions;
- Prevent and reduce child, adolescent, and young adult tobacco product use and secondhand smoke exposure; and
- Examine the prevalence and initiation of multiple tobacco product use and tobacco- cannabis co-use among priority groups.

3.3.2 Cancer prevention, treatment, and biology

It is widely recognized that tobacco use increases risk for multiple types of cancer. TRDRP funds research that will help to better understand the basic biological mechanisms of tobacco-related cancer initiation and malignant progression. Grantees are also studying new approaches to early detection and precision medicine therapies. They are also identifying ways to counteract the drug resistance that tumors develop which results in cancer progression and, in many cases, cancer deaths. Research areas, supported by the Centers for Disease Control and Prevention Report of the Surgeon General, include the following:

- Basic research into the molecular genetic mechanisms of tobacco-related cancer initiation, progression, and resistance to therapy;
- Translational research of new detection and treatment strategies for tobacco-related cancers; and
- Implementation of evidence-based health care policy and/or practice changes that show promise for reducing tobacco-related cancer deaths and health disparities in California.

3.3.3 Cardiovascular and cerebrovascular diseases

According to the CDC, cardiovascular disease remains the leading cause of death in California and tobacco use is the leading cause of these deaths. Currently, more than eight million Californians live with or have been diagnosed with cardiovascular disease or stroke-related conditions. TRDRP supports research that will address the following:

- Effects of new and emerging tobacco products on risk for or progression of cardiovascular disease or stroke;
- Relationship between atrial fibrillation and combustible and/or new and emerging tobacco products;
- Risk of heart diseases and stroke posed by new and emerging tobacco products and its impact on California populations; and
- Identification of new, culturally appropriate interventions to decrease cardiovascular and stroke-related health disparities among priority groups.

3.3.4 Environmental exposure and toxicology

The changing landscape of tobacco product availability has further complicated tobacco control, public understanding of risk evaluation, and new policy approaches. Scientific evaluation of these products is needed to better define exposure risks and toxicological profiles. In addition, increased co-use of tobacco and cannabis in outdoor or indoor environments requires reassessment of potential exposure health risks. Novel and well-established evaluation methods are needed to characterize patterns of exposure and risk in these venues. Examples of some of these research topics include the following:

- Toxicology and risk profiles of new tobacco products, including characterization of biomarkers of exposure from all tobacco products and studies on the persistence of biomarkers of combustible tobacco use in former smokers;
- Measurement of biomarkers of exposure to cannabis and tobacco using different methods of cannabis product use;
- Environmental and economic impact of the production, sale and use of new products and their related waste, plus new policy approaches to reduce or mitigate tobacco product waste at the municipal, county, and state levels;
- Policies to minimize involuntary exposure to secondhand smoke and secondhand vape aerosol and their associated health risks in all public settings; and
- Thirdhand smoke pathways of exposure characterization, risk evaluation, and toxicology.

3.3.5 Neuroscience of nicotine addiction and treatment

Nicotine dependence is the most common form of chemical dependence in the U.S. Studies have shown nicotine to be more addictive than heroin, cocaine, and methamphetamine. Many smokers find it nearly impossible to quit, despite

knowing that cigarette smoking increases their risk for cardiovascular and respiratory diseases, cancer, and other illnesses. The effects of co-use of nicotine with other substances such as alcohol and cannabinoids is another key area of research. Adolescents are particularly susceptible to addictions because of the formative stage of their brain development, and they often experiment with multiple substances consumed separately or combined in new nicotine delivery devices. It is important to understand the biology and behavioral aspects of co-use of nicotine with other substances among adolescents. Examples of some of these research topics include the following:

- Molecular, cellular, and behavioral effects of nicotine, with and without flavorants, on the developing brain;
- Effects of flavorants and other constituents of e-cigarette aerosol on nicotine addiction;
- Neuroimaging and other clinical studies on the acute effects of nicotine or flavorants, alone or combined, on human brain structure and function;
- Mechanistic characterization of biological and behavioral differences between female and male e-cigarette users during withdrawal;
- Development and neurological characterization of cessation approaches for e-cigarette-only and dual users;
- Development and neurological characterization of personalized treatment approaches for tobacco use disorders in LGBTQ individuals; and
- Addictive potential of combined nicotine and cannabinoid use in Black youth.

3.3.6 Oral Diseases and Dental Health

Cigarette smoking and smokeless tobacco use cause oral and dental health problems such as gum disease, bone loss, and cancers of the mouth and throat. Oral cancer risk for smokers and smokeless tobacco users is substantially higher than non-smokers. The impact of flavors, glycerin, and polyethylene glycol present in e-liquids on the oral cavity is unknown and requires further study in the laboratory and in the clinic. Proposition 56 provides funding to increase dental care for the most vulnerable populations in California. This suggests dental professionals may provide another route to deliver information on tobacco use prevention and cessation. Examples of some of these research topics include the following:

- Tools and cost-effective diagnostic methods of early detection of tobacco-related oral diseases,
- The impact of nicotine and flavored e-liquids on oral health, and
- Evaluation of cessation strategies practiced by dental professionals.

3.3.7 Pulmonary biology and lung diseases

Tobacco smoke is a key factor in the development and progression of chronic obstructive pulmonary disease (COPD), one of the leading causes of death in the U.S. COPD has a large social and economic impact in California, especially in disproportionately affected populations. These groups include people of low socioeconomic status, American Indian/Alaska Natives, multiracial non-Hispanics, and women. TRDRP supports research crucial to understanding the effects of tobacco products on the lung, the origin of and mechanisms of progression of pulmonary diseases that are caused by tobacco use or exposure, and studies that translate this knowledge into improved diagnostics and treatments. Examples of some of these research topics include the following:

- Mechanistic studies to better define the effects of tobacco products and their constituents on lung biology,
- Development of diagnostic and therapeutic approaches for the prevention and treatment of tobacco-related lung diseases,
- Discovery and understanding of lung disease related to co-use of different tobacco products and co-use of tobacco products with other substances of abuse, and
- Effects of pre-natal and neonatal exposure to tobacco products or their constituents on lung development and disease.

3.3.8 State and local tobacco control policy research

The tobacco control policy landscape is changing rapidly as it responds to the introduction of new and novel products. Policy research is needed to examine the retail industry, tobacco industry marketing, flavorants, cannabis use, and youth interest in new products. The tobacco industry spends billions of dollars marketing tobacco products through the retail environment; managing these channels is important to efforts to reduce youth tobacco product access. Policy research also creates opportunities for community partnerships to focus on evidence-based policy adoption. The following are examples of some of these research topics:

- Flushing out and countering tobacco industry marketing and corporate social responsibility efforts in an effort to protect youth from tobacco and cannabis marketing,
- Evaluation of retailer knowledge and compliance with new laws in an effort to characterize policy approaches that support stronger local tobacco control ordinances,
- Research to evaluate local regulations of menthol cigarettes and flavored tobacco to boost strategies to build support for minimum price and unit packaging, and
- Advancing mobile health interventions for tobacco treatment and healthcare policy.

3.3.9 Other tobacco-related health effects

TRDRP supports research projects on diseases not included in the eight priority areas listed above, as long as the disease has been identified as being causally associated with tobacco use in the Report of the Surgeon General or if tobacco-related products or their constituents are integral to the proposed study. Examples of some of these research topics include the following:

- Eye diseases including, but not limited to, age-related macular degeneration, cataracts, diabetic retinopathy, dry eye, glaucoma, and uveitis;
- Type 2 diabetes and associated serious health complications, such as poor blood flow leading to amputation and peripheral neuropathy; and
- Communicable diseases, such as influenza and COVID-19.

4 Looking Forward

Over the years covered by this report, TRDRP has continuously encouraged and supported critical research needed to inform the state's tobacco control activities and to improve the care for Californians stricken with tobacco-related diseases.

Programmatically, TRDRP seeks to heighten the influence of its funded research through the use of collective impact strategies that utilize teams of stakeholders, rather than individuals, from the inception through the completion of a project or initiative. On the grantmaking front, the success of the Community Practice-Based Research Implementation Projects, in terms of their impact on providing effective smoking cessation to the Medi-Cal population, fueled the desire to encourage more implementation research among TRDRP's grantees. The products of well-designed implementation research studies are tools and processes that may be more likely to lead to systems change than discovery-based studies.

The fact that smoking prevalence remains highest among populations that are plagued by other health disparities means that TRDRP will continue to fund research in this area and to encourage new approaches that will help result in reduced smoking prevalence for all. This is directly aligned with the California Endgame Initiative, which seeks to end the sale and use of all tobacco products in the state by the year 2030.

It was with these concepts in mind, along with survey data from primary stakeholders that TRDRP embarked on a new strategic planning process in 2019. The goals for the next five years include the following:

1. Serve as the leader in cutting-edge tobacco research by identifying and advancing innovative funding strategies that will drive policy and systems change.
2. Utilize collaborative and interdisciplinary approaches to identify key research needs and to implement effective dissemination strategies for impactful tobacco control policymaking.
3. Support communities most vulnerable to tobacco-related health disparities by providing real time, relevant and actionable research findings to promote health equity and reduce negative impacts of tobacco in all California communities.
4. Strive for excellence in the stewardship of grants and grantmaking operations by leveraging key partnerships, evaluating and improving processes and procedures, and enabling staff development.

Using these goals as a guide, TRDRP will continue to provide the State of California with timely, informative data needed to support tobacco control efforts and improved health for all Californians.

5 Appendices

Appendix I: Section 104500 of the Health and Safety Code: 104500. …(c)

"It is further the intent of the Legislature that on or before December 31, 2010, and every five years thereafter, the University of California transmit programmatic, as well as financial, reports to the state, including a report on the grants made, pending grants, program accomplishments, and the future direction of the program."

https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=HSC&division=103.&title=&part=3.&chapter=1.&article=2

Appendix 2: TRDRP Staff and Scientific Advisory Committee Members

The Legislature, Proposition 99, and Health and Safety Code Sections 104500-104545 mandate the structure of the Tobacco-Related Disease Research Program. During the period covered by this report, TRDRP staff has included a program director, four to five program officers, and a project policy analyst. The TRDRP program director and program officers all hold doctoral degrees and deep knowledge of research and grantmaking.

Proposition 99 also mandated the development of a Scientific Advisory Committee that would serve as the primary program advisory board for TRDRP. Members of the Scientific Advisory Committee advise the University of California on the direction and priorities of TRDRP. They also make funding recommendations for each cycle of peer-reviewed funded grants. Scientific Advisory Committee members represent research institutions and scientific fields involved in tobacco-related disease research and major California organizations involved in tobacco control efforts.

Current Staff

Tracy Richmond McKnight, Ph.D.
Director

Deborah Colosi, Ph.D.
Program Officer for Environmental Exposure and Toxicology (Thirdhand Smoke Consortium)

Ginny Delaney, Ph.D.
Program Officer for Biomedical Sciences (Cardiovascular and Cerebrovascular Disease, Oral Disease and Dental Health, and Environmental Impacts of Tobacco and Cannabis Waste)

Uta Grieshammer, Ph.D.
Program Officer for Biomedical Sciences (Neuroscience and Pulmonary Biology and Lung Disease)

Norval Hickman, Ph.D., M.P.H.
Program Officer for Social Behavioral Sciences and Public Health (Community Practice Research and Community Partnered Participatory Research)

Jennifer V. Jackson
Project Policy Analyst

Katherine McKenzie, Ph.D. (shared with California Breast Cancer Research Program)
Senior Program Officer for Cancer Prevention, Treatment, and Biology

Prior Staff Members 2015-2020

Bart Aoki, Ph.D.
Director (2015-2018)

Anwer Mujeeb, M.Sc., Ph.D.
Program Officer for Biomedical and Environmental Sciences

Marion Kavanaugh-Lynch, M.D., M.P.H.
Interim Director (2018-2019)

Raymond Boyle, PhD, MPH
Program Officer Policy Research and Environmental Sciences and Toxicology

Phillip Gardiner, Dr.P.H.
Program Officer for Policy and Regulatory Sciences

Current Scientific Advisory Board Members

Rebecca Williams, Dr.P.H., M.P.H., Chair
Chief, Evaluation and Surveillance Section
California Tobacco Control Program
Representing: California Department of Public Health
Term: 2018 – 2021

Jerold A. Last, Ph.D., Vice Chair
Distinguished Professor of Pulmonary and
Critical Care Medicine
University of California Davis
Representing: Environmental Sciences
Term: 2015 – 2022

Benjamin Bowser, Ph.D.
Professor Emeritus
Department of Sociology and Social Services
California State University East Bay
Representing: Social Behavioral
Term: 2020 – 2023

Susan Bradshaw, M.D., M.P.H.
Physician Specialist
Los Angeles County Department of Public Health
Representing: Community-Based Provider
Term: 2019 – 2022

Karina Camacho
Policy Manager
Tobacco Control
American Lung Association in California
Representing: American Lung Association
Term: 2020 – 2023

John Crockett, Ph.D.
Associate Vice President Research Advancement
San Diego State University
Representing: Tobacco-Related Disease Research Institution
Term: 2020 – 2023

Naomi Hamburg, M.D., M.Sc.
Associate Professor
Boston University School of Medicine
Representing: Biomedical
Term: 2019 – 2022

Jim Knox, M.P.P.
Managing Director, Government Relations
American Cancer Society
Representing: American Cancer Society
Term: 2020 – 2023

David Lee, M.D.
Associate Professor of Medicine
Director, Cardiac Catheterization and Intervention Laboratories
Director, Interventional Cardiology Fellowship Program
Stanford University School of Medicine
Representing: American Heart Association
Term: 2020 – 2023

Robert KJ. MacCoun, Ph.D.
Professor
Stanford Law School
Representing: Independent Research University of CA
Term: 2019 – 2022

Chunxia Wang, Ph.D.
Education Research and Evaluation Consultant
Tobacco Use Prevention Education Office
California Department of Education
Representing: California Department of Education
Term: 2019 – 2022

Term Ending 2020

Benjamin Chaffee, D.D.S., M.P.H., Ph.D.
Assistant Professor, Oral Epidemiology and Dental Public Health
University of California, San Francisco
Representing: Dentistry and Oral Health
Term: 2017 – 2020

Robin Corelli, PharmD
Professor, Department of Clinical Pharmacy
University of California, San Francisco
Representing: Clinical Pharmacy
Term: 2016 – 2020

John Maa, M.D.
Marin General Hospital
President, Northern California Chapter of the American College of Surgeons
Board of Directors, American Heart Association, San Francisco Division
Representing: American Heart Association
Term: 2011 – 2020

Jesse N. Nodora, Dr.P.H.
Assistant Professor, Department of Family and Preventive Medicine
University of California, San Diego
Moores Cancer Center
Representing: Ex-Officio TEROC
Term: 2014 – 2020

Dan J. Raz, M.D., M.A.S.
Assistant Professor
Surgical Director, Lung Cancer and Thoracic Oncology
City of Hope National Medical Center, Duarte
Representing: Lung Cancer Alliance
Term: 2013 – 2020

Stephen C. Welter, Ph.D., Vice Chair
Vice President, Research and Graduate Dean
San Diego State University
Representing: Tobacco-Related Disease Research Institute
Term: 2014 – 2020

Mimi C. Yu, Ph.D.
Professor (retired)
University of Southern California
Representing: American Cancer Society & Cancer Action Network
Term 2011 – 2020

Term Ending 2019

Denise Adams-Simms, M.P.H.
Executive Director
San Diego Black Health Associates
Representing: Community-Based Provider
Term: 2017 – 2019

Ricky N. Bluthenthal, Ph.D.
Professor, Department of Preventive Medicine
University of Southern California
Representing: Private Research Institute
Term: 2015 – 2019

Edith D. Balbach, Ph.D.
Professor, Emerita of Public Health and Family Medicine
Tufts University
Representing: Policy Researcher
Term: 2014 – 2019

Matthew Brenner, M.D.
Professor of Medicine, Department of Medicine
University of California, Irvine
Representing: Biomedical Research
Term: 2012 – 2019

Vanessa M. Marvin
Senior Director, Grassroots Advocacy and Field Strategy
American Lung Association
Representing: American Lung Association in California
Term: 2015 – 2019

Term Ending 2018

Sarah A. Planche, M.Ed.
School Health Education Consultant
Tobacco Use Prevention and Education Program
California Department of Education
Representing: California Department of Education
Term: 2014 – 2018

Xueying Zhang, M.S.
Research Scientist
California Tobacco Control Program
California Department of Public Health
Representing: California Department of Public Health
Term: 2015 – 2018

Term Ending 2017

Richard L. Barnes, J.D.
Health Science Clinical Professor, Department of Clinical Pharmacy
University of California, San Francisco
Representing: Ex-Officio TEROC
Term: 2015 – 2017

Term Ending 2016

Audrey Smith, M.A., R.D., C.D.E.
Director, Preventive Health Services
Watts Healthcare Corporation, Los Angeles
Representing: Community-Based Provider
Term: 2013 – 2016

Appendix 3: Tables of TRDRP Grants Awarded July 1, 2015 to June 30, 2020, by Research Priority Area. **2020 awards have been committed, not yet paid*

TABLE 5: GRANTS AWARDED JULY 1, 2015 TO JUNE 30, 2020 UNDER TRDRP PRIORITY: SOCIAL AND BEHAVIORAL PREVENTION AND TREATMENT

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Community Practice Award	2018	Embedding smoking cessation programs into community clinics	Friedman, Theodore	Friends Research Institute, Inc.	$1,822,584
Community Practice Award	2016	Ending tobacco use in high risk, low income smokers	Guydish, Joseph	University of California, San Francisco	$372,720
Community Practice Award	2018	Treating tobacco use among high risk, low income smokers	Guydish, Joseph	University of California, San Francisco	$1,835,949
Community Practice Award	2016	Building Tobacco Cessation Connections Across Los Angeles Co	Tong, Elisa	University of California, Davis	$387,222
Community Practice Award	2018	Expanding Los Angeles County eConsult Cessation Services	Tong, Elisa	University of California, Davis	$1,748,266
Community Partnered Participatory Research Award	2020*	Imperial Youth For A Tobacco-Free Environment	Greiner, Lydia	San Diego State University	$306,046
Community Partnered Participatory Research Award	2020*	Imperial Youth For A Tobacco-Free Environment	Olmedo, Luis	Comite Civico del Valle	$226,144
Community Partnered Participatory Research Award	2020*	Feasibility and Acceptability of a Suite of Tobacco Cessation Services for Low-Income Populations	Liu, Jie	Family Health Centers of San Diego	$329,760
Community Partnered Participatory Research Award	2020*	Feasibility and Acceptability of a Suite of Tobacco Cessation Services for Low-Income Populations	Strong, David	University of California, San Diego	$207,080
Community Partnered Participatory Research Award	2020*	¡VAMOS! Vaping among multicultural Orange County students	Foo, Mary	Orange County Asian and Pacific Islander Community Alliance, Inc.	$269,480
Community Partnered Participatory Research Award	2020*	¡VAMOS! Vaping among multicultural Orange County students	Tanjasiri, Sora	University of California, Irvine	$205,564
Community Academic Research Award	2015	Interactive Mobile Doctor (iMD) for Asian smokers	Quach, Thu	Asian Health Services	$211,357

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Community Academic Research Award	2015	Interactive Mobile Doctor (iMD) for Asian smokers	Tsoh, Janice	University of California, San Francisco	$239,286
Pilot Community Academic Research Award	2015	Development of an Afterschool Tobacco Use Prevention Program	Cowgill, Burton	University of California, Los Angeles	$175,822
Pilot Community Academic Research Award	2015	Development of an Afterschool Tobacco Use Prevention Program	Karibian, Kara	BREATHE California of Los Angeles County	$64,821
Pilot School Academic Research Awards	2015	Evaluation of California's TUPE Program	Zhu, Shu-Hong	University of California, San Diego	$200,542
CA Scholar of Targeted Advance Research	2017	Tech and Telephone Smoking Cessation Treatment for Young Veterans with PTSD	Herbst, Ellen	Northern California Institute for Research & Education	$333,090
CA Scholar of Targeted Advance Research	2017	Tech and Telephone Smoking Cessation Treatment for Young Veterans with PTSD	Herbst, Ellen	University of California, San Francisco	$146,789
Predoctoral Award	2020*	Intersectionality of Religion and Immigration with Smoking among Arab Americans in California's SJV	Alnahari, Sarah	University of California, Merced	$165,964
Predoctoral Award	2019	Mediators and Moderators of Combined Varenicline and Naltrexone for Smoking Cessation	Green, ReJoyce	University of California, Los Angeles	$89,671
Predoctoral Award	2019	Disparities in Life Course Tobacco Exposure and Breast Cancer Risk	Ihenacho, Ugonna	University of Southern California	$101,150
Predoctoral Award	2019	Spatial-, neighborhood- and healthcare system-related drivers of lung cancer treatment disparities	Obrochta, Chelsea	San Diego State University Research Foundation	$119,448
Predoctoral Award	2020*	Investigating the potential for non-tobacco wraps to displace cigarillos for blunt smoking	Shia, David	David Geffen School of Medicine at UCLA	$111,150
Predoctoral Award	2019	Increasing Consumer Awareness of Smoking Risks with Graphic Warnings	Stone, Matthew	University of California, San Diego	$103,350
Predoctoral Award	2019	Intersecting Inequities: Linking tobacco use to oral health disparities among Blacks and Latinx	Wright, Tashelle	University of California, Merced	$88,078

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Postdoctoral Award	2020*	Tobacco-related risk and cancer-related illness perceptions among low-income smokers	Durazo, Artuto	University of California, San Francisco	$68,170
Postdoctoral Award	2019	At the intersection of social inequity: tobacco use disparities among diverse LGBTQ adolescents	Felner, Jennifer	San Diego State University Research Foundation	$213,864
Postdoctoral Award	2016	Differential softening of smokers in California	Kulik , Margarete	University of California, San Francisco	$98,339
Postdoctoral Award	2019	Everyday smoking contexts and practices of bisexual young adults	McQuoid, Julia	University of California, San Francisco	$135,392
Postdoctoral Award	2020*	Tobacco and cannabis co-use among young adults: a multi-method analytic approach	Nguyen, Nhung	Lundquist Institute for Biomedical Innovation at Harbor-UCLA Medical Center	$142,450
Postdoctoral Award	2016	Smartphone-based smoking cessation with young adults	Thrul, Johannes	University of California, San Francisco	$63,073
Postdoctoral Award	2019	The Influence of Social Media on Adolescents' E-Cigarette Use	Vogel, Erin	Stanford University	$117,143
Postdoctoral Award	2019	Flavored tobacco initiation among youth and young adults	Watkins, Shannon	University of California, San Francisco	$62,243
Exploratory/ Developmental Award	2015	Influence of Hormone Use on Smoking among Transwomen/men	Nemoto, Tooru	Public Health Institute	$229,372
Exploratory/ Developmental Award	2015	A Comprehensive Investigation of ENDS Use in Adolescents	Rubinstein, Mark	University of California, San Francisco	$248,535
Pilot Award	2019	Novel Pharmacotherapy Approaches in Smokers with Serious Mental Illness	Anthenelli, Robert	University of California, San Diego	$498,794
Pilot Award	2017	E-cigarette and Tobacco Use Prevention for Deaf and Hard-of-Hearing Youth	Berman, Barbara	University of California, Los Angeles	$299,816
Pilot Award	2019	Reducing Disparities by Integrating Tobacco Cessation into HIV Care	Brouwer, Kimberly	University of California, San Diego	$497,790
Pilot Award	2018	Evaluating Relationship of Cannabis use and Tobacco Cessation	Chen, Timothy	Veterans Medical Research Foundation	$561,591

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Pilot Award	2019	The Use of Virtual Reality to Induce and Assess Nicotine Craving	Courtney, Kelly	University of California, San Diego	$335,352
Pilot Award	2018	Update KiR: An Evidence-Based Program Reducing Teen Tobacco & Cannabis Use	Drake, Pamela	Education Training and Research Associates, Inc.	$526,924
Pilot Award	2020*	N-Acetylcysteine for Smoking Cessation in Tobacco and Cannabis Co-Use: A Randomized Controlled Trial	Herbst, Ellen	University of California, San Francisco	$504,000
Pilot Award	2018	Tobacco and cannabis use among sexual and gender minorities	Holloway, Ian	University of California, Los Angeles	$500,866
Pilot Award	2019	Social Media-based Treatment: Engaging Sexual and Gender Minority Smokers	Humfleet, Gary	University of California, San Francisco	$499,397
Pilot Award	2020*	Nicotine Cessation: Adapting a Counseling Program for Emerging Adults	Krebs, Paul	University of California, San Diego	$577,587
Pilot Award	2019	Tobacco cessation and prevention for underserved Arab Americans: A pilot study	Lee, Juliet	PIRE California, Inc.	$635,235
Pilot Award	2019	VIP smoking cessation intervention for adults with serious mental illness	Leutwyler, Heather	University of California, San Francisco	$495,156
Pilot Award	2020*	Digital Mixed Methods to Identify and Characterize Vaping Illness in Young Adults in California	Mackey, Timothy	University of California, San Diego	$547,637
Pilot Award	2017	Tobacco industry influence on the video game industry	McDaniel, Patricia	University of California, San Francisco	$298,746
Pilot Award	2020*	Racial and Gender Discrimination, Tobacco Use, and Time Perspective among Adolescents	Mello, Zena	San Francisco State University	$619,228
Pilot Award	2018	Social Cognition in Relation to Tobacco Craving and Inflammation in HIV	Morgan, Erin	University of California, San Diego	$497,598
Pilot Award	2018	A Randomized Crossover Clinical Trial of Unfiltered Cigarettes	Oren, Eyal	San Diego State University Research Foundation	$654,488

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Pilot Award	2018	Comprehensive Program to Reduce Tobacco-Related Health Disparities in CHCs	Potter, Michael	University of California, San Francisco	$498,823
Pilot Award	2018	Informing interventions to reduce tobacco use among homeless women	Riley, Elise	University of California, San Francisco	$496,848
Pilot Award	2019	Technology-Assisted Motivational Interviewing and Referral Coach: The TAMI Coach	Satterfield, Jason	University of California, San Francisco	$500,000
Pilot Award	2017	American Indian Youth: PSA, Photovoice & Digital Storytelling	Soto, Claradina	University of Southern California	$396,000
Pilot Award	2018	WeChat to Quit: Engage Chinese Patients to Stop Smoking	Sun, Angela	Chinese Community Health Resource Center	$937,500
Pilot Award	2020*	Interactive Mobile Doctor (iMD) to Promote Tobacco Cessation among Cancer Patients	Tsoh, Janice	University of California, San Francisco	$519,918
Pilot Award	2017	Empower Korean Families to End Tobacco Use & Smoke Exposure	Tsoh, Janice	University of California, San Francisco	$330,454
Pilot Award	2018	Text Messaging-Based Smoking Cessation Program for Homeless Youth	Tucker, Joan	RAND Corporation	$687,334
Pilot Award	2020*	Randomized trial of a contingency management smoking cessation intervention for homeless adults	Vijayaraghavan, Maya	University of California, San Francisco	$520,000
Pilot Award	2016	A smoke-free home intervention in supportive housing	Vijayaraghavan, Maya	University of California, San Francisco	$319,871
Pilot Award	2018	CONNECT: Smoking Cessation and Lung Cancer Screening	Walsh, Judith	University of California, San Francisco	$499,241
Research Award	2015	Electronic Nicotine Delivery Systems and California Youth	Antin, Tamar	Scientific Analysis Corporation dba Institute for Scientific Analysis	$545,532
Research Award	2019	Youth-initiated tobacco harm reduction? A qualitative study of sexual and gender minorities	Antin, Tamar	Scientific Analysis Corporation dba Institute for Scientific Analysis	$1,099,868
Research Award	2020*	Nicotine and Tobacco Use among Rural Young Adults	Antin, Tamar	Scientific Analysis Corporation dba	$1,088,754

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
		in Northern California: A qualitative study		Institute for Scientific Analysis	
Research Award	2016	Measuring combined tobacco, e-cigarette, and marijuana use	Apollonio, Dorothy	University of California, San Francisco	$374,448
Research Award	2018	Vaping Nicotine and Cannabis in Adolescence and Early Adulthood	Barrington-Trimis, Jessica	University of Southern California	$1,230,250
Research Award	2018	Implementation Research to Reduce Colorectal Cancer Disparities	Bastani , Roshan	University of California, Los Angeles	$910,175
Research Award	2019	The Impact of Recreational Marijuana Legalization on Tobacco and Marijuana Co-Use	Cohen, Beth	University of California, San Francisco	$1,092,190
Research Award	2020*	Hands Off Tobacco and E-Cigarettes!: Tobacco & E-Cigarette Use Prevention for Deaf Youth	Cowgill, Burton	University of California, Los Angeles	$973,837
Research Award	2017	Project Towards No Nicotine: Afterschool Tobacco Use Prevention Program	Cowgill, Burton	University of California, Los Angeles	$397,095
Research Award	2019	Tobacco and Cannabis Intervention for Young Black MSM	D'Anna, Laura	California State University, Long Beach Foundation	$1,106,197
Research Award	2019	Disparities in Rates & Impact of Tobacco and Marijuana Use in UCLA Primary Care	Gelberg, Lillian	University of California, Los Angeles	$932,434
Research Award	2018	Smoking in California drug treatment: A policy intervention	Guydish, Joseph	University of California, San Francisco	$931,110
Research Award	2018	Evaluation of the Tobacco Prevention Toolkit	Halpern-Felsher, Bonnie	Stanford University	$1,175,996
Research Award	2019	Combined intranasal oxytocin and mindfulness training as a novel treatment for smoking cessation	Kirkpatrick, Matthew	University of Southern California	$499,316
Research Award	2020*	Dyadic psychosocial mechanisms of smoking relapse in sexual minority couples	Kirkpatrick, Matthew	University of Southern California	$1,234,563
Research Award	2015	Dual Use of Marijuana and Tobacco: Social Media and Youth	Lee, Juliet	PIRE California, Inc.	$538,179

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Research Award	2018	Mechanisms Linking Obsessive-Compulsive Symptoms and Tobacco Dependence	Leventhal, Adam	University of Southern California	$1,235,906
Research Award	2020*	Social media intervention to stop nicotine and cannabis vaping among adolescents	Ling, Pamela	Veterans Medical Research Foundation	$975,000
Research Award	2016	Youth Activity Spaces and Exposure to Tobacco Outlets	Lipperman-Kreda, Sharon	HBSA, Inc.	$452,776
Research Award	2018	Smoking Cessation in California Medicaid Programs	McMenamin, Sara	University of California, San Diego	$587,017
Research Award	2018	Health behaviors among emerging adult survivors of childhood cancers	Milam, Joel	University of Southern California	$710,328
Research Award	2019	Multilevel prevention of commercial tobacco-related harms on rural California Tribal lands	Moore, Roland	PIRE California, Inc.	$1,095,241
Research Award	2015	Using technology to help low-income and Latino smokers quit	Munoz, Ricardo	Palo Alto University, Inc.	$488,628
Research Award	2017	Barriers and Supports for Smoking Cessation: Latinos in Addiction Treatment	Pagano, Anna	HBSA, Inc.	$498,793
Research Award	2018	Smoking reinstatement in major depressive disorder	Pang, Raina	University of Southern California	$1,255,153
Research Award	2015	Tobacco Treatment for Employable Californians	Prochaska, Judith	Stanford University	$570,719
Research Award	2018	Marijuana Dispensaries and Adolescents' Use of Marijuana and Tobacco	Shi, Yuyan	University of California, San Diego	$895,649
Research Award	2016	EX-Teen American Indian Tobacco Use Cessation Program	Soto, Claradina	University of Southern California	$495,000
Research Award	2018	Tobacco Policies and Disparities: California vs. the US	Trinidad, Dennis	University of California, San Diego	$933,303
Research Award	2017	Tobacco and Marijuana Co-Use Among Emerging Adults in California	Tucker, Joan	RAND Corporation	$466,934
Research Award	2018	Proximity to cannabis retailers/dispensaries and adolescent cannabis use	Unger, Jennifer	University of Southern California	$1,237,497

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
New Investigator Award	2018	Impact of vape pen placement in music videos on young adults	Allem, Jon-Patrick	University of Southern California	$961,915
New Investigator Award	2018	Social Media Surveillance of Vulnerable, At-Risk Groups in Tobacco Control	Ayers, John	University of California, San Diego	$748,149
New Investigator Award	2020*	Youth Vaping in Los Angeles: Youths' Perceptions, Behaviors, and Outlet Density	Cancio, Roberto	University of Southern California	$853,800
Special Project	2015	Menthol & Flavor Tobacco Products Meeting	Bankston-Lee, Kimberly	Breathe California of Sacramento-Emigrant Trails	$2,500
Special Project	2019	SRNT 2019 Health Disparities Travel Awards	Bucaida, Amy	Society for Research on Nicotine and Tobacco	$5,000
Special Project	2018	What Millennials Need To Know About Blunts!	Hallett, Cynthia	American Nonsmokers' Rights Foundation	$5,000
Special Project	2015	2016 SRNT HD Travel Awards	Johnson, Mona	Society for Research on Nicotine and Tobacco	$3,181
Special Project	2018	SRNT 2018 Health Disparities Travel Awards	Johnson, Mona	Society for Research on Nicotine and Tobacco	$3,334

TABLE 6: GRANTS AWARDED JULY 1, 2015 TO JUNE 30, 2020 UNDER TRDRP PRIORITY: CANCER PREVENTION, TREATMENT, AND BIOLOGY

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Predoctoral Award	2019	Total Synthesis of Strictosidine, a Precursor to Vinblastine	Anthony, Sarah	University of California, Los Angeles	$133,677
Predoctoral Award	2018	Targeted Degradation of Proliferative E2F in Nicotine-Induced Lung Cancers	Barrett, Alison	University of California, Santa Cruz	$134,659
Predoctoral Award	2018	Synthesis of Noscapinoids for Treatment of Lung Cancer	Boit, Timothy	University of California, Los Angeles	$152,688
Predoctoral Award	2020*	Understanding Genetic Interactions in the p53 Network in Lung Adenocarcinoma Suppression	Boutelle, Anthony	Stanford University School of Medicine	$76,144

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Predoctoral Award	2019	Determining How the Intratumoral Environment Confers Stemness in Lung Cancer	Carrillo, David	University of California, Santa Cruz	$139,942
Predoctoral Award	2019	Characterization of Smoking-Associated Circulating Tumor DNA (ctDNA) for Lung Cancer	Cheng, Jordan	University of California, Los Angeles	$134,620
Predoctoral Award	2019	Developing a Novel Cell-free DNA Methylation Assay for Noninvasive Early Detection of Lung Cancer	Hamilton, Emily	Stanford University	$151,350
Predoctoral Award	2020*	Exploring the Periostin-mediated Cooperative Metastasis in Clear Cell Renal Cell Carcinoma	Ishihara, Moe	Stanford University	$135,381
Predoctoral Award	2019	Inhibiting a DNA damage control mechanism as a strategy to selectively kill lung cancer cells	Kronenberg, Michael	University of California, Los Angeles	$135,567
Predoctoral Award	2020*	Generation of engineered innate lymphoid cells for cancer immunotherapy using pluripotent stem cells	Li, Suwen	University of California, Los Angeles	$95,056
Predoctoral Award	2019	In situ vaccination of lung cancers with engineered dendritic cells combined with immunotherapy	Lim, Raymond John	University of California, Los Angeles	$135,132
Predoctoral Award	2019	Targeting factor acetylation in therapeutic resistance models of lung cancer	McMahon, Sarah	University of California, San Francisco	$139,085
Predoctoral Award	2020*	Non-invasive detection of cell-free RNA expression signatures in lung cancer	Nesselbush, Monica	University of California, San Francisco	$151,350
Predoctoral Award	2018	Total Synthesis of Delavatine A and its Structural Analogues	Palani, Vignesh	University of California, Berkeley	$159,924
Predoctoral Award	2020*	The serine-threonine kinase LKB1 regulates chromatin state in lung adenocarcinoma	Pierce, Sarah	Stanford University	$73,244
Predoctoral Award	2019	Identification of Proteins Involved in microRNA Production and Protection in Response to Radiation Therapy	Read, Graham	University of California, Los Angeles	$133,677
Predoctoral Award	2019	Validation of a Small Molecule Drug Target for Lung Cancer Treatment	Sander, Phillipp	Scripps Research Institute	$112,350

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Predoctoral Award	2018	Structural Mechanism of Rb Inactivation in Lung Adenocarcinoma	Tambo, Carrie	University of California, Santa Cruz	$134,659
Predoctoral Award	2019	Cancer cells alter protein synthesis rates to drive tumorigenesis	Wilkins, Kevin	University of California, San Francisco	$135,738
Predoctoral Award	2019	Defining regulators of hematopoietic stem cell self-renewal to prevent and treat blood cancers.	Worthington, Atesh	University of California, Santa Cruz	$139,942
Predoctoral Award	2020*	Global Profiling of Cell Surface Markers for Lung Cancers	Yan, Tianyang	University of California, Los Angeles	$142,203
Predoctoral Award	2015	Genomic approaches to identify SCLC biomarkers	Yang, Dian	Stanford University	$63,100
Predoctoral Award	2019	Predicting cell-cell interactions in the tumor microenvironment for non-small cell lung carcinoma	Yu, Alice	Stanford University	$85,522
Postdoctoral Award	2019	Stem cell signals in the initiation and progression of lung cancer	Barber, Alison	University of California, San Diego	$137,550
Postdoctoral Award	2015	Molecular and Cellular Phenotyping of Second Hand Smoke-Related Asthma	Bauer, Rebecca	Stanford University	$47,769
Postdoctoral Award	2018	Large-scale analysis of tumor suppressors in lung cancer	Cai, Hongchen	Stanford University	$173,676
Postdoctoral Award	2020*	Chemical Proteomics Manipulation of RNA Binding Proteins in Non-Small Cell Lung Cancer	Cao, Jian	University of California, Los Angeles	$198,036
Postdoctoral Award	2017	Electrochemical Analysis of DNMT1 and miRNA as Biomarkers of Lung Cancer	Deng, Yingxin	California Institute of Technology	$110,144
Postdoctoral Award	2020*	Multiplexed genetic analysis of KRAS hypermutations in lung cancer of smokers in mice model	Ding, Yi	University of California, Berkeley	$185,712
Postdoctoral Award	2019	Multilayer investigation of resistance mechanisms to WEE1 inhibition in small cell lung cancer	Drainas, Alexandros	Stanford University	$207,300
Postdoctoral Award	2016	A Differential Approach to Investigate Head and Neck Cancer	Eckhardt, Manon	J. David Gladstone Institutes	$118,800
Postdoctoral Award	2016	High-throughput systems to dissect Snail-driven malignancy	Fontebasso, Yari	University of California, Los Angeles	$69,879

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Postdoctoral Award	2019	Targeting pH Homeostasis as a Therapeutic Approach for Pancreatic Cancer	Galenkamp, Koen	Sanford Burnham Prebys Medical Discovery Institute	$196,351
Postdoctoral Award	2020*	Genetic determinants of immune evasion by metastatic lung cancer	Hebert, Jess	Stanford University	$207,300
Postdoctoral Award	2020*	A New Target for Lung Cancer Immunotherapy: RNA Editing	Hu, Shibin	Stanford University	$207,300
Postdoctoral Award	2019	Targeting the unique metabolic vulnerabilities of lung cancer	Jain, Shashi	University of California, San Diego	$199,872
Postdoctoral Award	2017	Analysis of Circulating Tumor RNA for Early Detection of Lung Cancer	Jeon, Young-Jun	Stanford University	$118,800
Postdoctoral Award	2019	Constructing a Lung Cancer Map of Drug Resistance States with Single-Cell Analysis	Karacosta, Loukia	Stanford University	$138,450
Postdoctoral Award	2019	Analysis of bladder cancer precursor formation as a basis for early therapeutic intervention	Kershner, Aaron	Stanford University	$193,320
Postdoctoral Award	2019	Defining the mechanism of dynamic matrix stiffening-driven lung cancer metastasis	Kim, Daehwan	University of California, San Diego	$193,320
Postdoctoral Award	2020*	Investigating the cell of origin for hepatocellular carcinoma	Kim, Eunsun	Stanford University	$207,300
Postdoctoral Award	2019	Investigating the Roles of Stromal AR in Prostate Cancer Progression	Liu, Yueli	University of California, Santa Cruz	$203,280
Postdoctoral Award	2018	Studies on SWI/SNF in 3D chromatin structure with viral episome as a model	Lyu, Yuanzhi	University of California, Davis	$212,207
Postdoctoral Award	2019	miR-200 MicroRNAs in Lung cancer metastasis	Mao, Suifang	University of California, Berkeley	$191,832
Postdoctoral Award	2019	Notch3 in Human Lung Adenocarcinoma Pathogenesis and Heterogeneity	Marini, Kieren	University of California, San Francisco	$179,886
Postdoctoral Award	2016	TERT expression and its involvement in pancreatic regeneration and PDAC	Neuhoefer, Patrick	Stanford University	$118,800
Postdoctoral Award	2019	Targeting nuclear receptors for the treatment of Pancreatic cancer	Rajbhandari, Nirakar	University of California, San Diego	$180,996
Postdoctoral Award	2019	Effects of Smoking on Hematopoietic Stem Cell	Ramanathan, Gajalakshmi	University of California, Irvine	$122,958

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
		Dysfunction and Hematologic Cancers			
Postdoctoral Award	2016	Molecular mechanisms of smoking-associated lung cancer	Rodon Ahnert, Laura	Salk Institute for Biological Studies	$118,449
Postdoctoral Award	2018	Targeting Macrophages in the Cancer Stem Cell Niche to Beat Chemoresistance	Sharrow, Allison	University of California, Los Angeles	$222,407
Postdoctoral Award	2018	Protein Engineering Aids Chimeric Antigen Receptor Design	Stern, Lawrence	Beckman Research Institute of the City of Hope	$173,676
Postdoctoral Award	2018	Genetic dissection of oncogenic Kras signaling in lung cancer	Tang, Rui	Stanford University	$180,653
Postdoctoral Award	2020*	Uncovering synthetic lethal interactors with TP53 mutations for therapeutic targeting	Wang, Mengxiong	Stanford University	$207,300
Postdoctoral Award	2018	HER3-biased Sec61 modulators for treatment of cancers	Wang, Haoyuan	University of California, San Francisco	$173,676
Postdoctoral Award	2019	Implications of stress-induced LPAR4 expression in lung and pancreatic cancers	Wu, Chengsheng	University of California, San Diego	$180,996
Postdoctoral Award	2020*	Clonal dynamics in lung adenocarcinoma	Zoltan Boross, Gabor	Stanford University	$208,200
Exploratory/ Developmental Award	2015	Lung Cancer Screening: The Views of Patients and Physicians	Kaplan, Celia	University of California, San Francisco	$249,475
Pilot Award	2018	Deciphering p53 Transcriptional Programs in Lung Cancer Suppression	Attardi, Laura	Stanford University	$611,377
Pilot Award	2019	The Role of p53-Ninj2 loop in Tumor Progression and Metastasis	Chen, Xinbin	University of California, Davis	$495,154
Pilot Award	2020*	Understanding the Role of FOXP3 in Regulating Expression of PD-L1 and Anti-tumor Immunity	Chin, Arnold	University of California, Los Angeles	$520,000
Pilot Award	2019	New mouse models for identifying driver mutations in tobacco-induced squamous cell lung cancer	Chuang, Pao-Tien	University of California, San Francisco	$500,000
Pilot Award	2017	Immunotheranostic MPI for Early Diagnosis of Tobacco-Related Lung Cancer	Conolly, Steven	University of California, Berkeley	$319,604

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Pilot Award	2020*	Developing a blood-based assay for early lung cancer detection	Diehn, Maximilian	Stanford University	$630,800
Pilot Award	2017	A Molecular Approach for Early Diagnosis of Lung Cancer	Diehn, Maximilian	Stanford University	$376,401
Pilot Award	2018	Treating NSCLC with Next-Gen RNAi Therapeutics Target	Dowdy, Steven	University of California, San Diego	$498,126
Pilot Award	2016	Metabolic and Carcinogen Effect of Electronic Cigarettes	Friedman, Theodore	Friends Research Institute, Inc.	$384,454
Pilot Award	2019	Understanding how submucosal gland myoepithelial cells respond to cigarette smoke	Gomperts, Brigitte	University of California, Los Angeles	$499,678
Pilot Award	2017	Understanding the Mechanisms of Smoking Induced Squamous Lung Cancer	Gomperts, Brigitte	University of California, Los Angeles	$299,718
Pilot Award	2020*	Repurposing GPCR-targeted drugs for the treatment of pancreatic cancer	Insel, Paul	University of California, Irvine	$520,000
Pilot Award	2019	Promoting Tumor Suppressor Activity in Pancreatic Cancer	Itkin-Ansari, Pamela	University of California, San Diego	$500,000
Pilot Award	2020*	Relationship between Galectin-1 and Radiation in Mobilizing MDSC in Head and Neck Cancer	Le, Quynh-Thu	Charles R. Drew University of Medicine & Science	$619,105
Pilot Award	2019	Immune mechanisms of FLASH radiotherapy: a new paradigm for lung cancer cure	Loo, Billy	Stanford University	$628,421
Pilot Award	2020*	Preclinical development of a first-in-class PCNA inhibitor for treating small cell lung cancer	Malkas, Linda	Beckman Research Institute of the City of Hope	$704,000
Pilot Award	2020*	Elucidating the mechanism by which cg05575921 predicts lung cancer risk	Offringa, Ite	University of Southern California	$660,000
Pilot Award	2019	Quantitative and Scalable Tumor Growth Map for Complex Genotypes in Lung Cancer	Petrov, Dmitri	Stanford University	$619,781
Pilot Award	2017	In-utero smoke exposure and epigenetic activation of GFI1-family oncogenes	Pierce, John	University of California, San Diego	$186,238
Pilot Award	2019	Role of the E3 ubiquitin ligase RNF125 in pancreatic cancer	Ronai, Ze'ev	Sanford Burnham Prebys Medical	$780,000

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
				Discovery Institute	
Pilot Award	2020*	Elucidating the role of PEA3 transcription factors in progression of small cell lung cancer	Roth, David	University of California, San Diego	$518,881
Pilot Award	2019	Combination immuno and metabolic therapy for early-stage lung adenocarcinoma	Scafoglio, Claudio	University of California, Los Angeles	$499,756
Pilot Award	2020*	Exploring the Role of LINE-1 Retrotransposon Silencing in Cigarette-Related Lung Cancer Recurrence	Spruck, Charles	Sanford Burnham Prebys Medical Discovery Institute	$780,000
Pilot Award	2016	Investigating the carcinogenicity of e-cig	Tommasi, Stella	University of Southern California	$395,951
Pilot Award	2019	Secondhand smoke, past smoking, diet, novel biomarkers and breast cancer metastasis.	Wu, Tianying	San Diego State University Research Foundation	$602,000
Pilot Award	2018	Tumor heterogeneity and cooperativity drive metastasis in RCC	Wu, Lily	University of California, Los Angeles	$499,678
Pilot Award	2018	Targeting invadopodia in head and neck cancer metastasis	Yang, Jing	University of California, San Diego	$498,393
Pilot Award	2020*	Exploring DNA Polymerase Eta as a Target to Overcome the Resistance to Platinum-based Drugs in NSCLC	Zhang, Jin	University of California, Davis	$514,000
Pilot Award	2016	microRNA biomarkers of THS teratogenicity	Zur Nieden , Nicole	University of California, Riverside	$293,205
Research Award	2017	Investigating the carcinogenic potential of e-cig in humans	Besaratinia, Ahmad	University of Southern California	$474,971
Research Award	2018	Are smokers switching to vaping at lower risk for cancer?	Besaratinia, Ahmad	University of Southern California	$1,229,278
Research Award	2017	Computer Vision for Detection of Tobacco Related Diseases	Brown, Matthew	University of California, Los Angeles	$365,413
Research Award	2019	Targeting aggressive kidney cancer cells deficient in a metabolic enzyme	Chen, Ching-Hsien	University of California, Davis	$937,500
Research Award	2018	Redefining KRAS dependency as a stress-inducible state	Cheresh, David	University of California, San Diego	$935,535

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Research Award	2018	Stemness suppressors to combat aggressive breast cancers	Desgrosellier, Jay	University of California, San Diego	$933,655
Research Award	2019	Development of allosteric inhibitors against a molecular target (IKK) induced by cytokines and cigarette smoke	Ghosh, Gourisankar	University of California, San Diego	$921,703
Research Award	2015	Smoking and Embryonal Tumor Study	Heck, Julia	University of California, Los Angeles	$448,150
Research Award	2018	Immune reactivity across the spectrum of disease in lung adenocarcinoma	Krysan, Kostyantyn	University of California, Los Angeles	$937,158
Research Award	2018	S-Nitrosylation of DNMTs in epigenetic regulation of tumors	Lipton, Stuart	Scripps Research Institute	$1,448,303
Research Award	2018	Natural Products for the Treatment of Never Smoker Lung Cancer	MacMillan, John	University of California, Santa Cruz	$935,133
Research Award	2018	MRI-Derived Risk Maps to Predict Prostate Cancer Progression	Noworolski, Susan	University of California, San Francisco	$924,132
Research Award	2017	Improved identification of subjects genetically at risk for lung cancer	Offringa, Ite	University of Southern California	$495,000
Research Award	2017	Nicotine metabolism and predicting lung cancer risk in African Americans	Park, Sungshim	University of Southern California	$496,005
Research Award	2017	In-utero smoke exposure and epigenetic activation of GFI1-family oncogenes	Pierce, John	University of California, San Diego	$186,238
Research Award	2018	Lung cancer cell response to Cdk4/6 inhibition	Rubin, Seth	University of California, Santa Cruz	$1,047,491
Research Award	2017	Double-strand Break by THS: Implications for Tobacco Cancer	Sarker, Altaf	Lawrence Berkeley National Laboratory	$581,626
Research Award	2017	SGLT2 in early diagnosis and treatment of lung cancer	Scagofolio, Claudio	University of California, Los Angeles	$414,716
Research Award	2015	A novel imaging technology for the early detection of Oral Cancer	St. John, Maie	University of California, Los Angeles	$404,143
Research Award	2018	Tobacco smoking and inborn genetics: effects on leukemogenesis	Wielmels, Joseph	University of Southern California	$1,215,889

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
New Investigator Award	2019	Impact of Smoking on Myeloproliferative Neoplasms	Brooks, Angela	University of California, Santa Cruz	$736,710
New Investigator Award	2018	Tackling Stem-Like Cells in Tobacco Smoke-Mediated Cancer Malignancy	Chen, Ching-Hsien	University of California, Davis	$750,000
New Investigator Award	2020*	Determining the carcinogenic potential of tobacco in pancreatic cancer	Engie, Dannielle	Salk Institute for Biological Studies	$1,154,400
New Investigator Award	2019	Impact of splicing factor mutations in the context of tobacco exposure in lung cancer	Fleischman, Angela	University of California, Irvine	$488,330
New Investigator Award	2018	Oncogenic reprogramming of protein translation by DDX3 inactivation	Floor, Stephen	University of California, San Francisco	$748,146
New Investigator Award	2018	Multilevel Study of Lung Cancer Screening Guidelines Implementation	Li, Jiang	Palo Alto Medical Foundation Research Institute	$886,353
New Investigator Award	2019	Novel Immunotherapeutics for Cigarette-Smoking Associated Acute Myeloid Leukemia	Zhang, Yong	University of Southern California	$990,000
Special Project	2015	Trends in Smoking Behavior & Lung Cancer in California	Pierce, John	University of California, San Diego	$61,992

TABLE 7: GRANTS AWARDED JULY 1, 2015 TO JUNE 30, 2020 UNDER TRDRP PRIORITY: CARDIOVASCULAR AND CEREBROVASCULAR DISEASES

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Predoctoral Award	2019	Study on maternal smoking during pregnancy and childhood metabolic outcomes	He, Si	University of California, Los Angeles	$89,996
Predoctoral Award	2018	Salt Inducible Kinases (SIKs): Novel Regulators of Cardiomyocyte Plasticity	Hsu, Austin	University of California, San Francisco	$135,846
Predoctoral Award	2018	Regulation of Endothelial Inflammatory Responses by GPCRs	Rada, Cara	University of California, San Diego	$133,793
Predoctoral Award	2020*	Engineering Extracellular Vesicles for Cardiovascular Repair and Regeneration	Ramasubramanian, Lalithasri	University of California, Davis	$146,641
Predoctoral Award	2020*	Reprogram nicotine exposed hematopoietic stem cells to inhibit stress induced megakaryopoiesis	Rodriguez y Baena, Alessandra	University of California, Santa Cruz	$153,594

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Predoctoral Award	2020*	Regulation of PAR1 inflammatory signaling by the alpha-arrestin ARRDC3	Wedegaertner, Helen	University of California, San Diego	$151,350
Postdoctoral Award	2019	Effects of long-term nicotine exposure on stem cell therapy	Chan, Alex	Stanford University	$207,300
Postdoctoral Award	2015	Cardiotoxicity Study of Tobacco Smoking Using hiPSC-CMs	Li, Yingxin	Stanford University	$145,800
Postdoctoral Award	2019	Effect of nicotine on the cardiac aging process	Liang, Wenjing	University of California, San Diego	$191,832
Postdoctoral Award	2019	Maternal inhaled nicotine develops a hypertensive phenotype in offspring	Liu, Bailin	Loma Linda University	$181,332
Postdoctoral Award	2018	Shear Stress : a Master Regulator of the Endothelial Chromatin Landscape	Moonen, Jan-Renier	Stanford University	$223,884
Postdoctoral Award	2020*	Elucidating the Mechanism of Tobacco-Related Cardiac Defects using CRISPR Screening	Nishiga, Masataka	Stanford University	$138,450
Postdoctoral Award	2018	Brd4 function in cardiac lineage commitment and morphogenesis.	Padmanabhan, Arun	University of California, San Francisco	$136,538
Postdoctoral Award	2020*	Regulation of endothelial GPCR-ubiquitin driven p38 inflammatory signaling	Patwardhan, Anand	University of California, San Diego	$198,036
Postdoctoral Award	2019	A Human iPSC-based Platform to Unravel the Role of Nicotine in the Pathogenesis of Abdominal Aortic Aneurysms	Shen, Mengcheng	Stanford University	$193,554
Postdoctoral Award	2018	E-cigarette smoking-induced cardiac injury in East Asian ALDH2*2 variant	Sinha Roy, Pritam	Stanford University	$209,484
Postdoctoral Award	2019	Modeling Smoking Induced Cardiac Dysfunction in 3D Microtissues	Thomas, Dilip	Stanford University	$128,086
Postdoctoral Award	2020*	The role of systemic mitochondrial dysfunction in COPD and cardiovascular disease risk	Tiller, Nicholas	University of California, San Francisco	$206,400
Postdoctoral Award	2015	Role of Tobacco Related Toxicants in Cardiovascular Disease	Watrous, Jeramie	University of California, San Diego	$145,800
Postdoctoral Award	2020*	Impact of cigarette smoking on the vascular endothelium at single cell resolution	Xiang, Menglan	Stanford University	$207,300
Postdoctoral Award	2017	Predilection of CHRNA5 SNP to smoking-related cardiotoxicity	Zhang, Joe	Stanford University	$118,800

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Pilot Award	2018	Dissecting Cardiovascular Effects of E-Cigarettes	Araujo, Jesus	University of California, Los Angeles	$535,618
Pilot Award	2017	Chronic Electronic Cigarette Use and Accelerated Skeletal Muscle Aging	Breen, Ellen	University of California, San Diego	$320,000
Pilot Award	2019	The role of Eukaryotic Translation Elongation Factor 1 Alpha 2 in cardiac function and disease	Chen, Ju	University of California, San Diego	$498,058
Pilot Award	2020*	Role of Perm1, a novel mitochondrial regulatory protein in cardiac ischemia	Cho, Toshitake	University of California, San Diego	$500,000
Pilot Award	2017	E-cigarette chemical effects on endothelial function	Gross, Eric	Stanford University	$377,598
Pilot Award	2018	Effect of nicotine exposure on mitochondria in myocytes	Gustafsson, Asa	University of California, San Diego	$500,000
Pilot Award	2017	Inflammatory cardiovascular disease induced by autonomic effects of e-cigs	Heller-Brown, Joan	University of California, San Diego	$320,000
Pilot Award	2018	Effects of e-cigarette aerosol on oral epithelial cell metabolism	Hu, Shen	University of California, Los Angeles	$483,801
Pilot Award	2018	Prenatal exposure of cigarette smoke impacts cardiac regeneration	Liao, Ronglih	Stanford University	$596,161
Pilot Award	2019	Effects of tobacco and e-cigarettes on heart repair and regeneration	Lien, Ching-Ling (Ellen)	Children's Hospital, Los Angeles	$675,220
Pilot Award	2019	Do E-Cigarettes Increase Risk for Sudden Death? Focus on the QT Interval	Middlekauff, Holly	University of California, Los Angeles	$497,148
Pilot Award	2020*	Acute Impact of Switching from Tobacco Cigarettes to E-Cigarettes in People Living with HIV	Middlekauff, Holly	University of California, Los Angeles	$520,000
Pilot Award	2020*	The role of the NLRP3 inflammasome in e-cigarette-induced cardiac inflammation and remodeling	Miyamoto, Shigeki	University of California, San Diego	$520,000
Pilot Award	2020*	Racial differences in smoking-related glaucoma progression: Effect on neural and vascular tissue	Moghimi Araghi, Sasan	University of California, San Diego	$400,000
Pilot Award	2019	Analysis of tobacco toxin-genetic interactions through study of the dioxin-AHR pathway	Quertermous, Thomas	Stanford University	$592,558

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Pilot Award	2016	E-Cigarettes and Coronary Endothelial Function in Dual Users	Rader, Florian	Cedars-Sinai Medical Center	$412,276
Pilot Award	2019	The Effects of Electronic Hookah on Endothelial Cell Function: The Role of Nicotine	Rezk-Hanna, Mary	University of California, Los Angeles	$498,723
Pilot Award	2019	Mechanistic basis of arrhythmogenic cardiac alternans following tobacco smoke exposure	Ripplinger, Crystal	University of California, Davis	$500,000
Pilot Award	2018	Whole Genome RNAseq Studies of Blood in Smokers vs Nonsmokers with Stroke	Sharp, Frank	University of California, Davis	$400,000
Pilot Award	2020*	Protective role of follistatin during electronic cigarette/nicotine (ENDS)-induced atherosclerosis	Singh, Rajan	University of California, Merced	$399,999
Pilot Award	2017	Nicotine and Epigenetic Transgenerational Risk of Abdominal Aortic Aneurysm	Spin, Joshua	Palo Alto Veterans Institute for Research	$326,640
Pilot Award	2019	Models for prospective studies of marijuana's cardiac effects	Springer, Matthew	University of California, San Francisco	$499,316
Pilot Award	2020*	Gender differences in response to nicotine – role of Akt / Pim-1 signaling axis	Sussman, Mark	San Diego State University Research Foundation	$1,128,750
Pilot Award	2017	Regulation of F2RL3/PAR4 Expression and Function by Methylat	Trejo, Joan	University of California, San Diego	$341,978
Pilot Award	2020*	Developing a luminal coating technology targeting vascular injury to promote reendothelialization	Wang, Aijun	University of California, Davis	$520,000
Research Award	2018	The role of PKDs in atherosclerosis and coronary heart disease	Chen, Ju	University of California, San Diego	$933,858
Research Award	2018	Parkin-mediated mitochondrial quality control and cardiovascular disease	Gustafsson, Asa	University of California, San Diego	$937,500
Research Award	2018	SRF Phosphorylation and the Progression to Heart Failure	Kapiloff, Michael	Stanford University	$1,209,921
Research Award	2018	Effects of Cigarette Smoking and Vaping on Heart Attack	Kloner, Robert	Huntington Medical Research Institute	$1,066,980
Research Award	2018	Tobacco regulation of amyloidogenic diseases	Liao, Ronglih	Stanford University	$1,098,139

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Research Award	2018	Tobacco Smoke Exposure and Atrial Fibrillation	Marcus, Gregory	University of California, San Francisco	$903,503
Research Award	2016	Cardiovascular Toxicity of E-Cigarettes: Role of Nicotine	Middlekauff, Holly	University of California, Los Angeles	$391,200
Research Award	2018	E-Cigs Excite the Human Splenocardiac Axis: Role of Nicotine	Middlekauff, Holly	University of California, Los Angeles	$935,983
Research Award	2019	Large scale analyses of gene-smoking interaction on cardiometabolic traits	Salem, Rany	University of California, San Diego	$874,673
Research Award	2020*	Transgenerational Effects of E-cigarette Vapor on Aortic Aneurysm Risk	Spin, Joshua	Palo Alto Veterans Institute For Research	$1,046,250
Research Award	2020*	Prenatal nicotine / tetrahydrocannabinol exposure promotes myocardial damage: a brain-heart parallel	Sussman, Mark	San Diego State University Research Foundation	$602,000
Research Award	2019	Underlying Mechanisms Regulating the Effects of Inhaled Nicotine upon Abdominal Aortic Aneurysm	Tsao, Philip	Palo Alto Veterans Institute For Research	$1,044,000
Research Award	2018	Molecular Pathogenesisand Therapy for Critical Limb Ischemia	Wang, Rong	University of California, San Francisco	$935,403
Research Award	2018	Human iPSCs for Elucidating Cardiovascular Risks of E-Cigarettes	Wu, Joseph	Stanford University	$1,197,500
Research Award	2019	Fetal nicotine exposure develops heart ischemia-sensitive phenotype	Xiao, DaLiao	Loma Linda University	$1,185,000
New Investigator Award	2019	Impact of Chronic Cannabis Exposure on Metabolic Health and Disease	DiPatrizio, Nicholas	University of California, Riverside	$743,386

TABLE 8: GRANTS AWARDED JULY 1, 2015 TO JUNE 30, 2020 UNDER TRDRP PRIORITY: ENVIRONMENTAL EXPOSURE AND TOXICOLOGY

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Predoctoral Award	2019	Mechanisms of Persistent Immune Dysregulation Following Early Life Tobacco Smoke Exposure	Bassein, Jed	University of California, Davis	$85,841

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Predoctoral Award	2019	Effects of Third Hand Smoke on Mitochondrial Genetic/Epigenetics and Their Inheritance Pattern	Giginis, Frantzeska	University of California, Riverside	$127,360
Predoctoral Award	2018	Health effects of e-cigarette refill fluids	Hua, My	University of California, Riverside	$103,350
Predoctoral Award	2019	Evaluating the Impact of Key Parameters on Evaporation of E-cigarette Aerosols	Li, Liqiao (Vicky)	University of California, Los Angeles	$133,674
Predoctoral Award	2019	Role of Oxidative Stress in Cigarette Smoke Induced Developing Germ Cell Death	Malott, Kelli	University of California, Irvine	$144,947
Predoctoral Award	2015	Tobacco sensitive regulation of pro-osteogenic promoters	Sparks, Nicole	University of California, Riverside	$63,150
Predoctoral Award	2018	Quantifying of Stem Cell Toxicology with Deep Neural Networks	Witmer, Adam	University of California, Riverside	$136,435
Exploratory/ Developmental Award	2015	Cigarette Butt-derived Pollutants in the Coastal Environment	Gossett, Rich	California State University, Long Beach Foundation	$200,000
Pilot Award	2020*	Impact of Smoking on the Immune System at Single Cell Resolution	Butcher, Eugene	Palo Alto Veterans Institute For Research	$558,000
Pilot Award	2020*	Co-Use of Tobacco and Cannabis in Pregnancy	Cortessis, Victoria	University of Southern California	$640,268
Pilot Award	2020*	Chemistry of freshly-emitted vaping aerosols: Implications for exposure, uptake and health	Destaillats, Hugo	Lawrence Berkeley National Laboratory	$758,650
Pilot Award	2017	Assessing the impact of heat-not-burn and next-generation vaping products	Destaillats, Hugo	Lawrence Berkeley National Laboratory	$434,330
Pilot Award	2019	A validated second hand smoking exposure model for Electronic Nicotine Delivery Systems (ENDS)	Edwards, Rufus	University of California, Irvine	$479,770
Pilot Award	2018	Effect of Nicotine, E-Cigs & Cannabinoids on the Gut Barrier	Ghosh, Pradipta	University of California, San Diego	$497,923

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Pilot Award	2019	Pilot Investigation of Tobacco and Cannabis Contaminants in an Urban Natural Reserve	Hoh, Eunha	San Diego State University Research Foundation	$602,000
Pilot Award	2020*	Enzyme-Based Antidotal Approach for the Treatment of Acute Nicotine Toxicity	Janda, Kim	Scripps Research Institute	$697,116
Pilot Award	2019	A Novel Mouse Model of Thirdhand Smoke-Induced Childhood Leukemia	Kogan, Scott	University of California, San Francisco	$542,378
Pilot Award	2017	Effects of Thirdhand Smoke Exposure on the Microbiome of Young Children	Matt, Georg	San Diego State University Research Foundation	$361,180
Pilot Award	2020*	Evaluation of the effects of tobacco smoking on clinical outcomes in children treated for leukemia	Metayer, Catherine	University of California, Berkeley	$434,188
Pilot Award	2016	Evaluation of tobacco and e-cigarette genotoxicity	O'Connor, Timothy	Beckman Research Institute of the City of Hope	$408,000
Pilot Award	2018	Tracking Tobacco Waste to Increase College Policy Engagement and Compliance	Pulvers, Kim	University Auxiliary and Research Services Corporation	$607,533
Pilot Award	2016	Silicone Wristbands: Personal Samplers for Tobacco Toxicants	Quintana, Penelope JE	San Diego State University Research Foundation	$360,488
Pilot Award	2018	Remediation of Tobacco Toxicants Polluting Low-Income Multiunit Housing	Quintana, Penelope JE	San Diego State University Research Foundation	$601,884
Pilot Award	2018	Tobacco and Cannabis: Effects on Fetal Development in Rats	Thomas, Jennifer	San Diego State University Research Foundation	$602,000
Pilot Award	2020*	Exosomes and vascular disease risk in new and emerging tobacco products	Timberlake, David	University of California, Irvine	$515,541
Pilot Award	2017	Does secondhand smoke induce epigenetic changes?	Tommasi, Stella	University of Southern California	$392,100
Pilot Award	2019	Evaluating a protocol for the removal of thirdhand smoke in homes of former smokers	Whitehead, Todd	University of California, Berkeley	$493,225

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Pilot Award	2019	Mitigating pro-inflammatory non-agonist molecules from tobacco smoke	Wong, Gerard	University of California, Los Angeles	$482,840
Research Award	2017	Triangulum (Tobacco, E-Cigarettes, Marijuana) SHS exposure in Low SES MUH	Baezconde-Garbanati, Lourdes	University of Southern California	$495,000
Research Award	2020*	Biomarker discovery for prospective studies on new and emerging tobacco products	Besaratinia, Ahmad	University of Southern California	$1,237,500
Research Award	2015	Air pollution, tobacco smoke, & asthma in minority children	Burchard, Esteban	University of California, San Francisco	$412,913
Research Award	2017	Prenatal tobacco smoke exposure and somatic alterations in childhood ALL	De Smith, Adam	University of Southern California	$207,122
Research Award	2019	Cancer prevention through low cost remediation of arsenic in drinking water	Gadgil, Ashok	University of California, Berkeley	$914,614
Research Award	2017	An IFN-gamma/mast cell axis in THS-exacerbated allergic airway inflammation	Galli, Stephen	Stanford University	$478,312
Research Award	2015	Genotoxicity and Novel Biomarkers of Thirdhand Smoke	Hang, Bo	Lawrence Berkeley National Laboratory	$644,618
Research Award	2018	Exposure to Marijuana Smoking: the Effect of Proximity	Hildemann , Lynn	Stanford University	$1,137,156
Research Award	2015	Metabolic consequences of tobacco toxicants	Jain, Mohit	University of California, San Diego	$421,875
Research Award	2019	Determining Risk of Transfer of Hookah Tobacco Thirdhand Smoke	Kassem, Nada	San Diego State University Research Foundation	$1,128,750
Research Award	2019	Tobacco and cannabis exposure during pregnancy in six race/ethnic subgroups in California	Kharrazi, Martin	Sequoia Foundation	$960,000
Research Award	2020*	Nicotine Exposure Alters Tissue Glucocorticoid Metabolism and Leads to Hypertension	Liu, Yanjun	Charles R. Drew University of Medicine & Science	$1,076,250
Research Award	2020*	Predicting Environmental Waste from Tobacco, Electronic Cigarette, and Marijuana Products	Matt, Georg	San Diego State University Research Foundation	$1,128,406

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Research Award	2018	Exposure to Tobacco, E-Cigarette, and Marijuana in Multi-Unit Housing	Matt, Georg	San Diego State University Research Foundation	$1,095,903
Research Award	2018	Genotoxic effects of alternative tobacco products and alcohol	O'Connor, Timothy	Beckman Research Institute of the City of Hope	$1,297,500
Research Award	2019	E-Cigarette Aerosol Characterization Using Holography and Machine Learning	Ozcan, Aydogan	University of California, Los Angeles	$936,669
Research Award	2019	Are mothers and their children at risk from in utero exposure to grandmaternal smoking?	Pearl, Michelle	Sequoia Foundation	$952,370
Research Award	2018	E-cigarette vaping, chemical composition and lung toxicity	Pinkerton, Kent	University of California, Davis	$910,493
Research Award	2015	Controlled Thirdhand Smoke Exposure Core	Schick, Suzaynn	University of California, San Francisco	$301,749
Research Award	2018	Measuring Environmental Tobacco and Cannabis	Schick, Suzaynn	University of California, San Francisco	$737,248
Research Award	2016	Tobacco/marijuana smoke: from lab to public health policy	Springer, Matthew	University of California, San Francisco	$373,988
Research Award	2016	Effect of voltage on electronic cigarette aerosol deposition	St. Helen, Gideon	University of California, San Francisco	$372,621
Research Award	2018	Toxicants and Cardiovascular Effects: Cannabis vs Tobacco	St. Helen, Gideon	University of California, San Francisco	$929,782
Research Award	2015	Cytotoxicity and Stress Induction by Thirdhand Smoke	Talbot, Prudence	University of California, Riverside	$444,081
Research Award	2017	Is Electronic Cigarette Aerosol Residue Hazardous?	Talbot, Prudence	University of California, Riverside	$385,491
Research Award	2019	What is the local lung dose of smoke from emerging tobacco products?	Wexler, Anthony	University of California, Davis	$935,724
Research Award	2017	Impacts of Electronic Cigarette Emissions on Indoor Air Qual	Zhu, Yifang	University of California, Los Angeles	$373,096
Natural Reserve System Pilot	2019	Tobacco and Cannabis Contaminants in Protected Areas	Holden, Patricia	University of California, Santa Barbara	$531,982

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Thirdhand Smoke Consortium	2018	California Consortium on Thirdhand Smoke Exposure & Health Effects	Benowitz, Neal	University of California, San Francisco	$454,842
Thirdhand Smoke Consortium	2018	THS Chemistry: Exposure assessment, detection and remediation	Destaillats, Hugo	Lawrence Berkeley National Laboratory	$1,285,559
Thirdhand Smoke Consortium	2018	Genetic Susceptibility to Thirdhand Smoke Effects	Hang, Bo	Lawrence Berkeley National Laboratory	$904,744
Thirdhand Smoke Consortium	2018	Thirdhand Smoke Biomarkers Analytical Chemistry Laboratory	Jacob, Peyton	University of California, San Francisco	$1,108,197
Thirdhand Smoke Consortium	2018	Translating mouse exposure studies into human health effects	Martins-Green, Georg	University of California, Riverside	$719,347
Thirdhand Smoke Consortium	2018	Thirdhand Smoke Dissemination, Outreach, and Resource Center	Matt, Georg	San Diego State University Research Foundation	$1,632,625
Thirdhand Smoke Consortium	2018	Reducing exposure to thirdhand smoke in multiunit housing	Quintana, Penelope JE	San Diego State University Research Foundation	$1,179,720
Thirdhand Smoke Consortium	2018	Controlled Human Exposure and THS Generation Core	Schick, Suzaynn	University of California, San Francisco	$907,034
Special Project	2016	Dissemination of health impacts of thirdhand tobacco smoke	Benowitz, Neal	University of California, San Francisco	$3,271
Special Project	2016	Thirdhand Smoke Policy Workshop	Samet, Jonathan	University of Southern California	$4,981
Special Project	2016	Are iQOS Aerosols Cytotoxic?	Talbot, Prudence	University of California, Riverside	$62,500

TABLE 9: GRANTS AWARDED JULY 1, 2015 TO JUNE 30, 2020 UNDER TRDRP PRIORITY: NEUROSCIENCE OF NICOTINE ADDICTION AND TREATMENT

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Predoctoral Award	2020*	Investigation of neural ensembles underlying nicotine withdrawal-induced hyperalgesia	Hui, May	University of California, Irvine	$161,553

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Predoctoral Award	2019	Neuroimaging to detect brain network differences among heavy drinking smokers treated with different cessation aids	Lim, Aaron	University of California, Los Angeles	$45,058
Postdoctoral Award	2019	Effects of Prenatal Nicotine and THC on the Brain's Reward System and Nicotine In Adolescence	Lallai, Valeria	University of California, Irvine	$203,280
Postdoctoral Award	2018	The Action of Nicotine and Nicotine Cessation Drugs Inside the Cell	Nichols, Aaron	California Institute of Technology	$182,184
Postdoctoral Award	2016	Lateral septum circuitry underlying vulnerability to nicotine consumption	Shin, Sora	University of California, San Diego	$118,800
Pilot Award	2020*	Neural circuit basis of susceptibility to nicotine addiction	Beier, Kevin	University of California, Irvine	$508,701
Pilot Award	2016	Early Nicotine Exposure Re-Wires Neural Circuits	Berg, Darwin	University of California, San Diego	$299,335
Pilot Award	2016	mGlu7 activators as drug candidates for nicotine dependence	Cosford, Nicholas	The Burnham Institute for Medical Research	$481,721
Pilot Award	2019	Nicotinic Receptor Modulators in Nicotine Dependence	Fowler, Christie	University of California, Irvine	$495,000
Pilot Award	2017	Asolescent nicotine and cannabinoid exposure on nicotine dependence	Fowler, Christie	University of California, Irvine	$300,000
Pilot Award	2016	Therapeutic potential of oxytocin for nicotine addiction	Kirkpatrick, Matthew	University of Southern California	$397,815
Pilot Award	2017	Visualizing Neural Activity Dynamics During Nicotine Reward	Lammel, Stephan	University of California, Berkeley	$266,321
Pilot Award	2017	Understanding Nicotine and Smoking Cessation Drugs: Release from Presynaptic Terminals	Lester, Henry	California Institute of Technology	$660,000
Pilot Award	2020*	Functional Role of a Human Polymorphism in the Alpha6 NAChR Subunit in Adolescent Nicotine Seeking	Lotfipour, Shahrdad	University of California, Irvine	$514,018
Pilot Award	2019	Smoking in Bipolar Disorder: Contribution of Sensory and Cognitive Brain Functions and Genomics	Patterson, Julie	University of California, Irvine	$498,582

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Pilot Award	2018	Fetal Nicotine Exposure Alters Bone Marrow Stem Cell Function Permanently	Rehan, Virender	LA Biomedical Research Institute at Harbor-UCLA Medical	$563,438
Pilot Award	2020*	Consequences of adolescent exposure to nicotine and THC by vapor inhalation in rats	Taffe, Micael	University of California, Los Angeles	$520,000
Research Award	2018	Neuroinflammation and Smoking Cessation Treatment Response	Brody, Arthur	Veterans Medical Research Foundation	$1,066,612
Research Award	2019	Evaluating Highly Selective Nicotinic Receptor Agonists and Antagonists	Dougherty, Dennis	California Institute of Technology	$1,227,300
Research Award	2018	Developmental nicotine exposure: neutransmitter plasticity & drug abuse	Dulcis, Davide	University of California, San Diego	$926,775
Research Award	2020*	Long-term Effects of Adolescent E-Cigarette Vapor on Drug Intake and Therapeutic Response	Fowler, Christie	University of California, Irvine	$951,000
Research Award	2017	Longitudinal Effects of Nicotine on the Developing Adolescent Brain	Galvan, Adriana	University of California, Los Angeles	$364,974
Research Award	2018	Effects of nicotine e-cigarette self-administration on addiction-like behaviors in rats	George, Olivier	University of California, San Diego	$591,784
Research Award	2020*	Role caveolin in tobacco use and nicotine signaling in traumatic brain injury	Head, Brian	University of California, San Diego	$971,957
Research Award	2015	Role of Glutamate/ACh co-release in nicotine addiction	Hnasko, Thomas	University of California, San Diego	$421,875
Research Award	2018	Cannabis and Tobacco Co-Use and the Developing Brain	Jacobus, Joanna	University of California, San Diego	$928,325
Research Award	2015	The role of PACAP/PAC1 receptor system in nicotine addiction	Lutfy, Kabirullah	Western University of Health Sciences	$477,581
Research Award	2018	Genetic relationship between impulsivity and nicotine abuse	Palmer, Abraham	University of California, San Diego	$935,550
Research Award	2017	Role of a6* nAChR-mediated signaling in nicotine withdrawal	Perez, Xiomara	SRI International	$561,596
Research Award	2019	Long-term impact of cannabis exposure on the adolescent brain	Piomelli, Daniele	University of California, Irvine	$681,841

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Research Award	2015	Prevention of relapse in nicotine dependence: role of mGluR7	Risbrough, Victoria	University of California, San Diego	$421,875
New Investigator Award	2020*	Elucidation of neural circuits underlying nicotine reward and relapse	Beier, Kevin	Huntington Medical Research Institute	$762,538
New Investigator Award	2020*	Effect of CBD on nicotine addiction: evidence from translational models of nicotine intake in rats	Kallupi, Marsida	University of California, San Diego	$777,900
New Investigator Award	2019	Elucidating the genetic basis of nicotine dependence by using electronic health records	Sanchez Roige, Sandra	University of California, San Diego	$743,841

TABLE 10: GRANTS AWARDED JULY 1, 2015 TO JUNE 30, 2020 UNDER TRDRP PRIORITY: ORAL DISEASES AND DENTAL HEALTH

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Predoctoral Award	2018	Predicting response to mTOR inhibitors in oral cancer	Nachmanson, Daniela	University of California, San Diego	$150,867
Postdoctoral Award	2019	Effects of cigarette smoke on inflammasome activation in oral cells	Coutinho Almeida da Silva, Cassio Luiz	University of the Pacific	$176,616
Postdoctoral Award	2019	Functions of caspase-8 mutations in development of head and neck cancer and anti-tumor immunity	Cui, Zhibin	University of California, San Francisco	$247,872
Postdoctoral Award	2019	The effect of combustible cigarettes and electronic cigarettes on oral candida pathogenesis	Haghighi, Farnoosh	University of California, Los Angeles	$198,036
Postdoctoral Award	2019	Epigenetic mechanisms in the inflammatory oral lesion of smokers	Lee, Jaeyoung	University of California, Los Angeles	$198,036
Postdoctoral Award	2020*	The effect of E-cigarettes on tongue epithelium and taste bud regeneration	Miller Zmora, Irit	University of California, San Francisco	$198,036
Postdoctoral Award	2018	Role of exosomes in rescuing Xerostomia in head and neck cancer patients	Viswnathan, Vignesh	Stanford University	$200,297
Pilot Award	2018	Infrared Imaging Methods for the Detection and Diagnosis of Root Caries	Fried, Daniel	University of California, San Francisco	$496,112
Pilot Award	2019	Understanding the mechanisms of perineural invasion in oral cancer	Goga, Andrei	University of California, San Francisco	$500,000

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Pilot Award	2019	Impact of cigarette smoking on dental pulp mesenchymal stem cells mediated tissue regeneration	Xiao, Nan	University of the Pacific	$505,604
Research Award	2018	The effect of tobacco on oral mucosal renewal and regeneration	Klein, Ophir	University of California, San Francisco	$934,501
Research Award	2018	Systemic aging and salivary stem cells	Knox, Sarah	University of California, San Francisco	$934,778
Research Award	2020*	Smartphone-based Oral Scanner Pen for Non-Specialist Oral Cancer Detection in Tobacco Users	Wilder-Smith, Petra	University of California, Irvine	$973,383

TABLE 11: GRANTS AWARDED JULY 1, 2015 TO JUNE 30, 2020 UNDER TRDRP PRIORITY: PULMONARY BIOLOGY AND LUNG DISEASES

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Predoctoral Award	2019	Smoking's Impact on Influenza Pathogenesis and Live Attenuated Vaccine Response	Chavez, Jerald	University of California, Riverside	$89,118
Predoctoral Award	2019	Understanding how perinatal nicotine exposure influences immune establishment and function for life	Cool, Taylor	University of California, Santa Cruz	$139,942
Predoctoral Award	2019	Selectin-targeted glycocalyx mimetic as a treatment for pulmonary inflammation	Dehghani, Tima	University of California, Davis	$132,097
Predoctoral Award	2020*	Understanding of the mechanisms of airway repair after e-cigarette exposure.	Durra, Abdo	University of California, Los Angeles	$166,350
Predoctoral Award	2020*	Role of Macrophage Polarization in Pulmonary Fibrosis	Yang, David	University of California, Davis	$146,641
Postdoctoral Award	2018	Exosome Release and the Immune Response to Exercise in COPD	Abbasi, Asghar	LA Biomedical Research Institute at Harbor-UCLA Medical	$193,320
Postdoctoral Award	2020*	The Impact of E-Cigarettes on Lung Immunity and Repair	Dash, Barsha	University of California, San Diego	$196,570
Postdoctoral Award	2016	miR-34/449 miRNAs in airway multiciliated cells	Song, Rui	University of California, Berkeley	$9,551
Postdoctoral Award	2018	Inflammatory State of Macrophages and COPD Exacerbation	Vasudevan, Sreelakshmi	University of California, San Francisco	$177,972

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Postdoctoral Award	2018	Defining the Role of Hedgehog Signaling in Emphysema	Wang, Chaoqun	University of California, San Francisco	$180,996
Postdoctoral Award	2020*	E-cigarette smoking-induced pulmonary endothelial dysfunction in East Asian ALDH2*2 Variant	Yu, Xuan	Stanford University	$207,300
Pilot Award	2016	Dendritic-epithelial cells crosstalk in lung inflammation	Agrawal, Anshu	University of California, Irvine	$300,000
Pilot Award	2018	Determining a role for long noncoding RNAs in smoke-induced COPD	Carpenter, Susan	University of California, Santa Cruz	$519,043
Pilot Award	2019	Impact of JUUL Use on Lung Physiologic and Immune Health and Systemic Inflammation	Crotty Alexander, Laura	Veterans Medical Research Foundation	$571,531
Pilot Award	2019	Engineered Proteins to Reverse Chitin Buildup and Fibrotic Lung Disease	Fraser, James	University of California, San Francisco	$492,252
Pilot Award	2019	The Effect of Combined Tobacco and Marijuana Use on Pulmonary Function: A Pilot Study	Keyhani, Salomeh	University of California, San Francisco	$586,820
Pilot Award	2020*	Amniotic exosomal extracellular RNA from fetal lung affected by prenatal nicotine exposure	Kim, Yong	University of California, Los Angeles	$460,791
Pilot Award	2020*	Novel Use of Human iPSC Derived Airway Progenitor Cells to Measure E-cigarette Toxicity	Miller, Lisa	University of California, Davis	$483,513
Pilot Award	2017	Development of the COPD Phenotype:Role of the IL-22/IL-22R1 Axis	Miller, Lisa	University of California, Davis	$299,333
Pilot Award	2020*	Wearable Sensors to Monitor Exacerbation Risk In Chronic Obstructive Pulmonary Disease	Rossiter, Harry	Lundquist Institute for Biomedical Innovation at Harbor-UCLA Medical Center	$641,425
Pilot Award	2020*	Vaping effects on adolescent airway mucosa	Royer, Christopher	University of California, Davis	$519,988
Pilot Award	2020*	The deleterious effects of nicotine and e-cigarette flavorants on lung mesenchymal stem cells	Shi, Wei	Children's Hospital, Los Angeles	$666,706
Research Award	2019	Characterization of innate immunity in pollution-induced exacerbation in Chronic Obstructive Pulmonary Disease (COPD)	Arjomandi, Mehrdad	University of California, San Francisco	$933,635

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Research Award	2018	Tobacco Exposure and Asthma Disparity in Minority Children	Burchard, Esteban	University of California, San Francisco	$935,584
Research Award	2018	Role of a Critical Cell Surface Molecule in Tobacco-induced Lung and Gut Inflammation	Butcher, Eugene	Palo Alto Veterans Institute for Research	$1,002,925
Research Award	2018	Therapeutic targeting to inhibit lung fibrosis progression	Chen, Ching-Hsien	University of California, Davis	$925,286
Research Award	2020*	Understanding the effects of e-cigarettes on airway epithelial repair and homeostasis	Gomperts, Brigitte	University of California, Los Angeles	$972,000
Research Award	2018	Pulmonary Innate Lymphoid Cells and airway inflammation in COPD	Haczhu, Angela	University of California, Davis	$937,500
Research Award	2018	Role of DNA damage in Pulmonary Artery Hypertension	Hata, Akiko	University of California, San Francisco	$937,500
Research Award	2018	GLP-1 Agonists in Severe Asthma	Kenyon, Nicholas	University of California, Davis	$937,500
Research Award	2015	Airway inflammation in the evolution of airway fibrosis	Nishimura, Stephen	University of California, San Francisco	$421,284
Research Award	2019	Gestational E-Cigarette Exposure, Transgenerational Asthma, and the Germ Cell Epigenetic Memory	Rehan, Virender	Lundquist Institute for Biomedical Innovation at Harbor-UCLA Medical Center	$1,048,215
Research Award	2018	Improving diagnostic and therapeutic imaging tools for better management of Chronic Obstructive Pulmonary Disease	Santhanam, Anand	University of California, Los Angeles	$919,571
Research Award	2019	Pulmonary Neuroendocrine Cells as a Sensor in Tobacco Induced Lung Diseases	Sun, Xin	University of California, San Diego	$937,500
New Investigator Awards	2020*	Effects of Tobacco Smoke and e-Cigarette Vapors on Lung Epithelium Mechanics	Andresen Eguiluz, Roberto	Loyola Marymount University	$206,225
New Investigator Awards	2019	Regulation of lung type 2 immunity in tobacco smoke-related allergic asthma	Molofsky, Ari	University of California, San Francisco	$750,000
New Investigator Awards	2018	Modulation of hedgehog signaling in tobacco-related emphysema	Peng, Tien	University of California, San Francisco	$734,678
New Investigator Awards	2018	Multiethnic Risk for Lung Disease: Genetics and Smoking	Polfus, Linda	University of Southern California	$990,000

TABLE 12: GRANTS AWARDED JULY 1, 2015 TO JUNE 30, 2020 UNDER TRDRP PRIORITY: STATE AND LOCAL TOBACCO CONTROL POLICY RESEARCH

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Conference Award	2018	2019 National Cannabis Summit	Frazier, Linda	Advocates for Human Potential	$100,000
Predoctoral Award	2015	The Impact of Trade Agreements on Domestic Health Regulation	Crosbie, Eric	University of California, Santa Cruz	$29,293
Predoctoral Award	2020*	Tobacco Free Generation Policy in the Philippines: An Endgame Strategy	de Leon, Kathleen	University of California, San Francisco	$148,941
Predoctoral Award	2018	Spatial Analysis of Tobacco, Vape Shop and Cannabis Retailers	Escobedo, Patricia	University of Southern California	$101,882
Exploratory/ Developmental Award	2015	Impact of health reform on smoking and treatment utilization	Young-Wolff, Kelly	Kaiser Foundation Research Institute	$294,174
Pilot Award	2019	Digital Surveillance to Identify Alternative & Emerging Tobacco Industry Mobilization and Influence	Mackey, Timothy	University of California, San Diego	$495,186
Pilot Award	2016	Fighting Big Tobacco with Big Data	Proctor, Robert	Stanford University	$229,057
Pilot Award	2018	Local cannabis regulation: what have we learned from tobacco	Silver, Lynn	Public Health Institute	$455,992
Pilot Award	2019	A “digital” mixed methods evaluation of university tobacco-free policies	Yang, Joshua	CSU Fullerton Auxiliary Services Corporation	$540,733
Research Award	2019	The impact of cartoon-based marketing strategies on e-cigarette appeal and use among adolescents	Allem, Jon-Patrick	University of Southern California	$1,225,844
Research Award	2017	Effects of California's 2016 tobacco policies on initiation, use, & quitting	Apollonio, Dorothy	University of California, San Francisco	$374,400
Research Award	2019	A Community Based Approach to Tobacco Control	Grills, Cheryl	Loyola Marymount University	$974,719
Research Award	2016	Do Assurances of Voluntary Compliance Reduce Youth Access and Marketing?	Henriksen, Lisa	Stanford University	$458,502
Research Award	2017	Put It Out Project for Sexual and Gender Minority Smokers	Humfleet, Gary	University of California, San Francisco	$386,973

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
Research Award	2018	Impact of new policies on young adult tobacco and marijuana	Ling, Pamela	University of California, San Francisco	$908,748
Research Award	2017	Readiness for and obstacles to California's tobacco endgame	Malone, Ruth	University of California, San Francisco	$374,772
Research Award	2015	The Cost of Smoking for CA's Racial/Ethnic Communities	Max, Wendy	University of California, San Francisco	$165,972
Research Award	2017	The Economic Impact of the California Tobacco 21 Law	Max, Wendy	University of California, San Francisco	$374,819
Research Award	2020*	Trends in disparities in Smoking Behavior with 4 major, different tobacco control programs	McMenamin, Sara	University of California, San Diego	$956,219
Research Award	2020*	State and Local Policies on Cigarette Smoking Behaviors and Disparities	Meng, Ying-Ying	University of California, Los Angeles	$898,203
Research Award	2015	Population studies of new tobacco products and cigarettes	Messer, Karen	University of California, San Diego	$406,492
Research Award	2016	Toward Equity in Smokefree Worksite Policies, SHS Exposure & Retail Density	Prochaska, Judith	Stanford University	$424,460
Research Award	2018	Economic Impact of Proposition 56 on Low-Income Californians	Sung, Hai-Yen	University of California, San Francisco	$917,959
Research Award	2017	Southern California Vape Shop Reactions to New Policies	Sussman, Steven	University of Southern California	$495,000
Research Award	2017	Did CTCP impact on youth affect lifetime cigarettes smoked?	Wiencke, John	University of California, San Francisco	$299,337
Research Award	2019	The impact of price on the demand for marijuana and cigarettes	Yao, Tingting	University of California, San Francisco	$937,500
Research Award	2017	The impact of price on the demand for electronic cigarettes	Yao, Tingting	University of California, San Francisco	$374,677
New Investigator Award	2020*	Eliminating in-home smoking to protect children and other non-smokers	Bellettiere, John	University of California, San Diego	$816,896
New Investigator Award	2019	Community College Smokefree Policies: Disparities, Contexts and Strategies	Lui, Camillia	Public Health Institute	$948,641
New Investigator Award	2020*	Effect of minimum floor price laws on tobacco consumption	White, Justin	University of California, San Francisco	$775,774

MECHANISM	YEAR FUNDED	TITLE	INVESTIGATOR(S)	INSTITUTION(S)	DOLLARS
MacKay Pacific Rim Policy Research Award	2016	California, trade pacts, tobacco control: lessons to learn	Bialous, Stella	University of California, San Francisco	$365,288
MacKay Pacific Rim Policy Research Award	2018	Policy Research to Denormalize Tobacco Use in CA-Pacific Rim Outdoors	Mock, Jeremiah	University of California, San Francisco	$935,668
Policy Center	2018	UC Merced Nicotine and Cannabis Policy Center	Song, Anna	University of California, Merced	$3,785,037
Rapid Response Policy Award	2020*	Regulating menthol cigarettes: understanding how restrictions affect retailers and smokers	Smiley, Sabrina	University of Southern California	$565,450
Special Project	2015	Clearing the Air: An Institute for Policy Advocacy	Hallett, Cynthia	American Nonsmokers' Rights Foundation	$5,000
Special Project	2017	What's Menthol Got to Do with it! Everything!	Hallett, Cynthia	American Nonsmokers' Rights Foundation	$5,000
Special Project	2017	Documenting the Regulation of Marijuana Use in Smokefree Environment	Hallett, Cynthia	American Nonsmokers' Rights Foundation	$5,750
Special Project	2018	Clearing the Air Institute	Hallett, Cynthia	American Nonsmokers' Rights Foundation	$5,000
Special Project	2015	The effects of the Proposed $2 tobacco tax on cigarettes	Lightwood, James Milton	University of California, San Francisco	$49,917
Special Project	2015	Impact of cigarette taxes on healthcare expenditures in CA	Max, Wendy	University of California, San Francisco	$40,763
Special Project	2015	Public Opinion Regarding Electronic Cigarettes in California	Unger, Jennifer	University of Southern California	$165,000

TABLE 13: EMERGENCY RAPID RESPONSE COVID-19 SEED GRANTS AWARDED IN 2020 *

TITLE	INVESTIGATOR	INSTITUTION NAME	DOLLARS
Enabling rapid point-of-care diagnostics through genotype screening of Covid-19 virus	Bandaru, Prabhakar	University of California, San Diego	$25,000
Interleukin Receptor Antagonist Immunosuppression of COVID-19 Hyperinflammation in COPD mice	Breen, Ellen	University of California, San Diego	$25,000

TITLE	INVESTIGATOR	INSTITUTION NAME	DOLLARS
Impact of Cigarette Smoking and e-Cigarette Vaping on COVID-19	Das, Soumita	University of California, San Diego	$25,000
Stratifying COVID-19 patients for predisposition and treatment of heart disease	Frazer, Kelly	University of California, San Diego	$25,000
A graphene-based multiplexed sensor for ultra-fast and low-cost COVID-19 diagnosis and monitoring	Gao, Wei	California Institute of Technology	$25,000
AI-guided rapid repurposing of therapeutics for COVID-19	Ghosh, Pradipta	University of California, San Diego	$25,000
Determining the effects of smoking/vaping on COVID-19 lung disease severity	Gomperts, Brigitte	University of California, Los Angeles	$25,000
Teen Vaping Patterns During and After COVID Pandemic Shelter-in-Place Orders	Gribben, Valerie	University of California, San Francisco	$25,000
Using biomarkers to identify at-risk patients for severe complications from COVID-19	Grimes, Kevin	Stanford University	$25,000
Protection of diabetic macaques against SARS-CoV-2 using self-adjuvanting immunogens	Hartigan-O'Connor, Dennis	University of California, Davis	$25,000
Deep learning radiographic early detection of COVID-19 pneumonia	Hsiao, Albert	University of California, San Diego	$25,000
Considering COVID-19 in an Urban Environmental Justice Community: Impacts, Resilience, and Stressors	Johnston, Jill	University of Southern California	$25,000
PPE for All: Simple Strategies to Protect Vulnerable Populations	Jokerst, Jesse	University of California, San Diego	$25,000
AI-based Platform to Predict COVID-19 Progress and Outcome based on Patients' Chest X-ray	Kheradvar, Arash	University of California, Irvine	$25,000
Non-contact Home Monitoring of COVID-19 Infections in Patients with Cardiopulmonary Diseases	King, Kevin	University of California, San Diego	$25,000
Culturally Tailored COVID-19 Risk Awareness for CA Middle Eastern/North African Waterpipe Users	Lee, Juliet	PIRE California, Inc.	$24,887
The Impact of Smoking, Comorbidities, and Race/Ethnicity on COVID-19 Infection and Disease Severity	Li, Jiang	Palo Alto Medical Foundation Research Institute	$25,000
Forecasting hospital bed resources needed to address the COVID-19 outbreak in California counties	Martin, Natasha	University of California, San Diego	$25,000
Novel Mechanisms of Smoking-Related Severe COVID-19 Lung Injury: Insights and Applications to Vaping	Middlekauff, Holly	University of California, Los Angeles	$25,000
Rapid Examination of Collateral Threats to Population Behavioral Health during the COVID19 Pandemic	Nobles, Alicia	University of California, San Diego	$25,000
Effect of tobacco and e-cigarettes on the immune status and ACE2 levels in COVID-19 infection	Ongkeko, Rutherford(Weg)	University of California, San Diego	$25,000
Cardiovascular Risk Factors, Antihypertensives and Covid-19 Infection Severity and Progression.	PARIKH, Nisha	University of California, San Francisco	$25,000

TITLE	INVESTIGATOR	INSTITUTION NAME	DOLLARS
Understanding the social determinants of the COVID-19/tobacco link: survey of Central Valley Latinx	Song, Anna	University of California, Merced	$24,868
Supporting LGBTQ+ Individuals during COVID-19	Soule, Katherine	University of California, ANR	$25,000
Does marijuana or e-cigarette use upregulate the SARS-CoV-2 receptor ACE2 in airway epithelium?	Springer, Matthew	University of California, San Francisco	$25,000
Relationship Between Smoking, Vaping, and Covid Infection	Talbot, Prue	University of California, Riverside	$25,000
Novel assays for characterizing SARS-CoV-2 transcription	Telwatte, Sushama	University of California, San Francisco	$25,000
Role of ACE2 Receptors in Morbidity, Mortality, and Therapy for COVID-19 Acute Respiratory Distress	Wallace, Art	Northern California Institute for Research & Education	$25,000
Intelligent design of antibodies targeting SARS-CoV-2	Wang, Wei	University of California, San Diego	$25,000
Service Utilization and Survival Strategies of Unsheltered Homeless During the COVID-19 Pandemic	Welsh, Megan	San Diego State University Research Foundation	$16,050
Developing Natural Language Processing Tools for Mining the Rapidly Evolving COVID-19 Literature	Xin, Huolin	University of California, Irvine	$25,000
SARS-CoV-2 proteome interaction with host transcriptome	Yeo, Gene	University of California, San Diego	$25,000
Smoking as a risk factor for COVID-19 onset and severity	Young-Wolff, Kelly	Kaiser Foundation Research Institute	$25,000

TABLE 14: COVID-19 CONTINUATION GRANTS AWARDED IN 2020*

TITLE	INVESTIGATOR	INSTITUTION NAME	DOLLARS
Innate immune responses against COVID-19 in the elderly and those with underlying conditions	Agrawal, Anshu	University of California, Irvine	$195,000
A Graphene-based Multiplexed Sensor for Ultra-fast and Low-cost COVID-19 Diagnosis and Monitoring	Gao, Wei	California Institute of Technology	$257,075
AI-guided Rapid Repurposing of Therapeutics for COVID-19	Ghosh, Pradipta	University of California, San Diego	$195,000
Real-Time Population Mental Health Tracking During the COVID-19 Pandemic	Nobles, Alicia	University of California, San Diego	$195,000
Sewage Surveillance to monitor COVID19 outbreak	Whiteson, Katrine	University of California, Irvine	$195,000
Smoking and COVID-19 onset and severity in a US integrated healthcare delivery system	Young-Wolff, Kelly	Kaiser Foundation Research Institute	$242,554

TABLE 15: CANNABIS-RELATED GRANTS AWARDED BETWEEN JULY 1, 2015-JUNE 30, 2020

YEAR	TITLE	INVESTIGATOR	INSTITUTION NAME	DOLLARS
2015	Dual Use of Marijuana and Tobacco: Social Media and Youth	Lee, Juliet	PIRE California, Inc.	$538,179

YEAR	TITLE	INVESTIGATOR	INSTITUTION NAME	DOLLARS
2016	Measuring combined tobacco, e-cigarette, and marijuana use	Apollonio, Dorothy	University of California, San Francisco	$374,448
2016	Tobacco/marijuana smoke: from lab to public health policy	Springer, Matthew	University of California, San Francisco	$373,988
2017	Triangulum (Tobacco, E-Cigarettes, Marijuana) SHS exposure in Low SES MUH	Baezconde-Garbanati, Lourdes	University of Southern California	$495,000
2017	Documenting the Regulation of Marijuana Use in Smokefree Environment	Hallett, Cynthia	American Nonsmokers' Rights Foundation	$5,750
2017	Tobacco and Marijuana Co-Use Among Emerging Adults in California	Tucker, Joan	RAND Corporation	$466,934
2018	Vaping Nicotine and Cannabis in Adolescence and Early Adulthood	Barrington-Trimis, Jessica	University of Southern California	$1,230,250
2018	Evaluating Relationship of Cannabis use and Tobacco Cessation	Chen, Timothy	Veterans Medical Research Foundation	$561,591
2018	Tobacco and Cannabis Intervention for Young Black MSM	D'Anna, Laura	California State University, Long Beach Foundation	$1,106,197
2018	Update KiR: An Evidence-Based Program Reducing Teen Tobacco & Cannabis Use	Drake, Pamela	Education Training and Research Associates, Inc.	$526,924
2018	Spatial Analysis of Tobacco, Vape Shop and Cannabis Retailers	Escobedo, Patricia	University of Southern California	$101,882
2018	2019 National Cannabis Summit	Frazier, Linda	Advocates for Human Potential	$100,000
2018	Exposure to Marijuana Smoking: the Effect of Proximity	Hildemann, Lynn	Stanford University	$1,137,156
2018	Tobacco and cannabis use among sexual and gender minorities	Holloway, Ian	University of California, Los Angeles	$500,866
2018	Cannabis and Tobacco Co-Use and the Developing Brain	Jacobus, Joanna	University of California, San Diego	$928,325
2018	Impact of new policies on young adult tobacco and marijuana	Ling, Pamela	University of California, San Francisco	$908,748
2018	Exposure to Tobacco, E-Cigarette, and Marijuana in Multi-Unit Housing	Matt, Georg	San Diego State University Research Foundation	$1,095,903
2018	Measuring Environmental Tobacco and Cannabis	Schick, Suzaynn	University of California, San Francisco	$737,248
2018	Marijuana Dispensaries and Adolescents' Use of Marijuana and Tobacco	Shi, Yuyan	University of California, San Diego	$895,649
2018	Local Cannabis Regulation: What have we learned from tobacco	Silver, Lynn	Public Health Institute	$455,992
2018	UC Merced Nicotine and Cannabis Policy Center	Song, Anna	University of California, Merced	$3,785,037
2018	Toxicants and Cardiovascular Effects: Cannabis vs Tobacco	St. Helen, Gideon	University of California, San Francisco	$929,782
2018	Tobacco and Cannabis: Effects on Fetal Development in Rats	Thomas, Jennifer	San Diego State University Research Foundation	$602,000

YEAR	TITLE	INVESTIGATOR	INSTITUTION NAME	DOLLARS
2018	Proximity to cannabis retailers/dispensaries and adolescent cannabis use	Unger, Jennifer	University of Southern California	$1,237,497
2019	The Impact of Recreational Marijuana Legalization on Tobacco and Marijuana Co-Use	Cohen, Beth	University of California, San Francisco	$1,092,190
2019	Impact of Chronic Cannabis Exposure on Metabolic Health and Disease	DiPatrizio, Nicholas	University of California, Riverside	$743,386
2019	Disparities in Rates & Impact of Tobacco and Marijuana Use in UCLA Primary Care	Gelberg, Lillian	University of California, Los Angeles	$932,434
2019	Pilot Investigation of Tobacco and Cannabis Contaminants in an Urban Natural Reserve	Hoh, Eunha	San Diego State University Research Foundation	$602,000
2019	Tobacco and Cannabis Contaminants in Protected Areas	Holden, Patricia	University of California, Santa Barbara	$531,982
2019	The Effect of Combined Tobacco and Marijuana Use on Pulmonary Function: A Pilot Study	Keyhani, Salomeh	University of California, San Francisco	$586,820
2019	Tobacco and cannabis exposure during pregnancy in six race/ethnic subgroups in California	Kharrazi, Martin	Sequoia Foundation	$960,000
2019	Long-term impact of cannabis exposure on the adolescent brain	Piomelli, Daniele	University of California, Irvine	$681,841
2019	Models for prospective studies of marijuana's cardiac effects	Springer, Matthew	University of Southern California	$1,231,893
2019	The impact of price on the demand for marijuana and cigarettes	Yao, Tingting	University of California, San Francisco	$937,500
2020	Co-Use of Tobacco and Cannabis in Pregnancy	Cortessis, Victoria	University of Southern California	$640,268
2020	N-Acetylcysteine for Smoking Cessation in Tobacco and Cannabis Co-Use: A Randomized Controlled Trial	Herbst, Ellen	University of California, San Francisco	$504,000
2020	Social media intervention to stop nicotine and cannabis vaping among adolescents	Ling, Pamela	Veterans Medical Research Foundation	$975,000
2020	Predicting Environmental Waste from Tobacco, Electronic Cigarette, and Marijuana Products	Matt, Georg	San Diego State University Research Foundation	$1,128,406
2020	Tobacco and cannabis co-use among young adults: A multi-method analytic approach	Nguyen, Nhung	Lundquist Institute for Biomedical Innovation at Harbor-UCLA Medical Center	$142,450
2020	Does marijuana or e-cigarette use upregulate the SARS-CoV-2 receptor ACE2 in airway epithelium?	Springer, Matthew	University of California, San Francisco	$25,000